COAL AGE

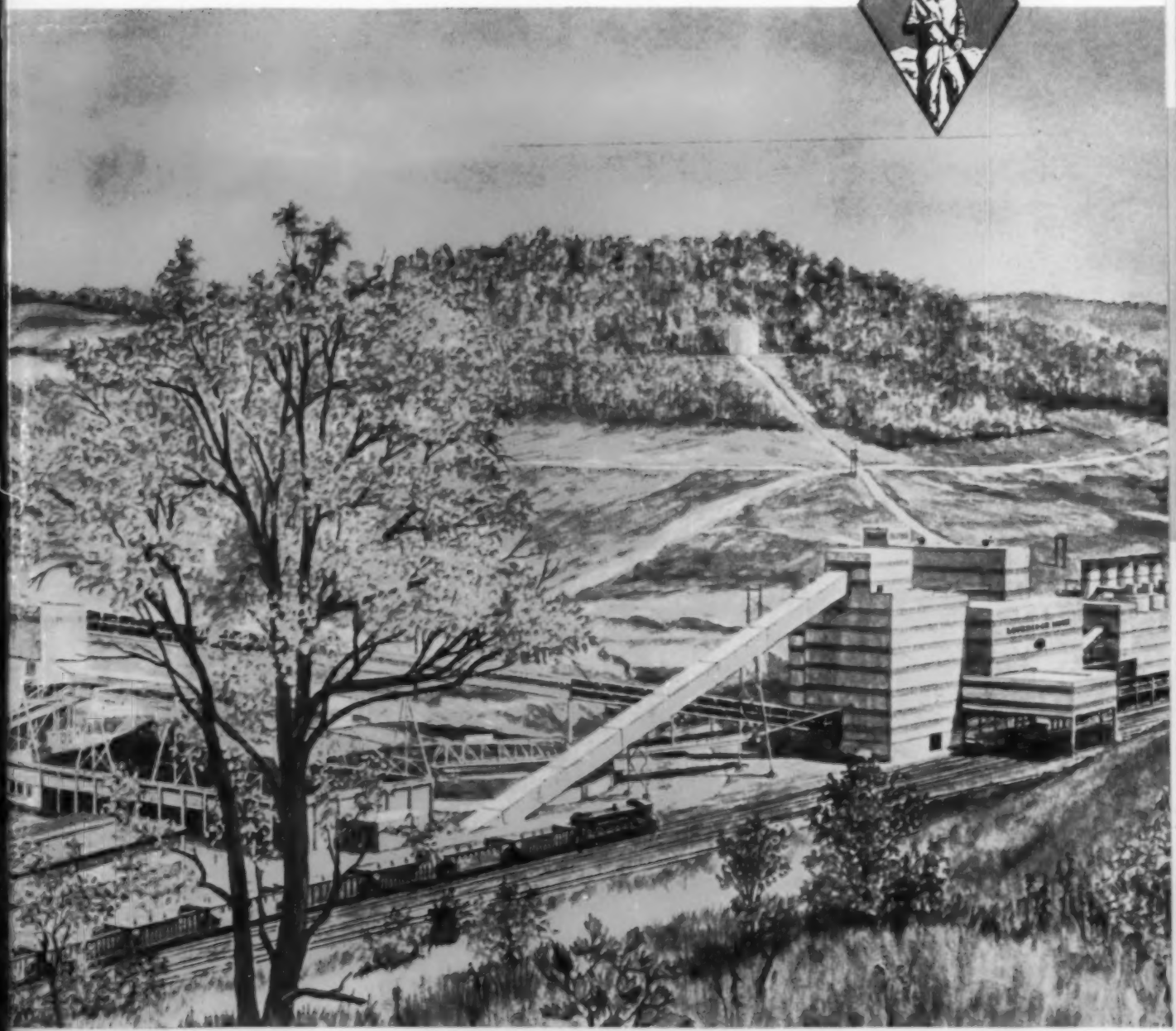
DECEMBER, 1959

Coal Age Operating Guide:

Mine Storage of Coal . . . p 105

A McGRAW-HILL PUBLICATION

PRICE $1



The Loveridge Story . . . p 78

MSA's continuous MinePhone research and development assures dependable underground communication in mines and areas previously thought inaccessible for this type of equipment.

Built-in → quality here

increases safety and dependability here

The motorman has clear, instant voice communication with the dispatcher or other motormen while trips are moving.

M-S-A MinePhone helps mine operators gain and maintain fast, high-capacity haulage schedules

Briefly, here's how the M-S-A® MinePhone helps keep haulage schedules abreast of production in today's mechanized mines.

The MinePhone coordinates trip traffic for safe, fast, productive haulage control. Trip control avoids excessive power loads for economical operation. Assures better distribution of cars for peak loading efficiency.

Further, a MinePhone system reduces frequency of motormen and trip riders getting on and off trips. This saves time. Minimizes chances of injury. Reduces wear and tear on haulage equipment caused by excessive stopping and starting.

Finally, the MinePhone speeds up operations of maintenance crews. Provides an efficient, time-saving underground call system. Keeps main line haulageways free of time-consuming traffic tie-ups.

Your MSA representative would be pleased to arrange a demonstration for you. Call him in for an evaluation of your communication needs. And write us for informative literature on the MinePhone.

MINE SAFETY APPLIANCES COMPANY
201 North Braddock Avenue, Pittsburgh 8, Pennsylvania

MINE SAFETY APPLIANCES CO. OF CANADA, LTD.
Toronto, Calgary, Edmonton, Montreal, Sydney, Vancouver, Winnipeg

MSA® SAFETY EQUIPMENT HEADQUARTERS

B.F.Goodrich

Belt takes a giant step

B.F.Goodrich improvements in rubber brought extra savings

POURING up that steep grade is a never-ending stream of rock—waste from the coal preparation plant in the valley. It's carried by a conveyor belt, at the rate of 400 tons an hour, almost a third of a mile to the top of that 500-foot high ridge. Ordinarily it would take at least three or more belts to lift heavy loads like this so far. But this B.F.Goodrich belt does it in one hop—and at a terrific saving.

In this exclusive B.F.Goodrich conveyor belt design, individual steel cords run lengthwise in the belt. Each cord is completely surrounded and cushioned by rubber so that it can stand the impact of heavy loads. These parallel cords give tremendous strength, yet are flexible so that troughing is natural.

Because of its steel cord construction, the B.F.Goodrich belt can do the job of three or four belts on this high lift, long distance installation. It eliminates the transfer points necessary with a conveyor system built in several stages with ordinary belts, saving money on the original installation and in reduced maintenance costs.

This B.F.Goodrich steel cord belt has been in operation nearly two years and is expected to give many more years of service. A similar belt carrying ore on the Iron Range is in its 11th season, has lasted longer than any conveyor belt ever made with steel cords or cables.

Your B.F.Goodrich distributor has exact specifications for the B.F.Goodrich belt described here. And, as a factory-trained specialist in rubber products, he can answer your questions about the many rubber products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Co., Dept. M-755, Akron 18, Ohio.*

B.F.Goodrich *conveyor belts*

DODGE STEEL CONVEYOR PULLEYS • DODGE STEEL PILLOW BLOCKS CHOSEN FOR WEIRTON'S NEWEST CONVEYOR SYSTEM

DODGE TAPER-LOCK
STEEL CONVEYOR PULLEYS

DODGE ALL-STEEL PILLOW BLOCKS
WITH TIMKEN BEARINGS

Two of the most dependable products known in the field of mechanical power transmission are used to insure the uninterrupted flow of material in the new plant of Weirton Steel Company division of National Steel Corporation. Dodge Taper-Lock Steel Conveyor Pulleys and Dodge All-Steel Pillow Blocks with Timken Bearings, were chosen for the entire system of belt conveyors—designed and installed by Koppers Company, Inc., Engineering and Construction Division.

Maximum strength with minimum weight is provided by Dodge Conveyor Pulleys. The steel rims, discs and hubs are fused together into jointless drum construction for terrific impact resistance. And with the unsurpassed holding power of Taper-Lock mounting there is no "walking on the shaft."

Dodge All-Steel Pillow Blocks are expressly designed for industry's toughest jobs. They are rugged, compact, fully self-aligning—with *high* radial and thrust capacities. And they are permanently adjusted, lubricated and sealed at the factory—for a long life of dependable service.

DODGE MANUFACTURING CORPORATION
3000 Union Street, Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."

THE ORIGINAL solid-woven PVC belting

THE MOST in tons of coal carried per dollar of cost

THE ONLY solid-woven PVC belting proved in American mining

is

Scandura®

GOLD PVC LINE

MINE BELTING

The weight of solid experience gives force to mining's favor for SCANDURA—first PVC belting in the field and leader in conveyor performance by every measure of comparison. When you specify Scandura for your long-haul or extensible needs, you get the lighter, flexible, stronger solid-woven belting that outruns all competition in service and savings. See your National Mine man for the facts on your application!

Made in U.S.A.

Manufactured at CHARLOTTE, NORTH CAROLINA
by SCANDINAVIA BELTING CO.

National Mine Service Company

Koppers Building Pittsburgh 19, Pa.

DISTRIBUTING DIVISIONS:

ALL-STATE DIVISION Logan, W. Va. | ANTHRACITE DIVISION Forty Fort, Pa. | BEMECO DIVISION Beckley, W. Va.

KY.-VA. DIVISION Jenkins, Ky. | MOUNTAINEER DIVISION Morgantown, W. Va. | WESTERN KY. DIVISION Madisonville, Ky. | WHITEMAN DIVISION Indiana, Pa.

MANUFACTURING DIVISIONS:

ASHLAND DIVISION Ashland, Ky. | CLARKSON DIVISION Nashville, Ill. | GREENSBURG DIVISION Greensburg, Pa.

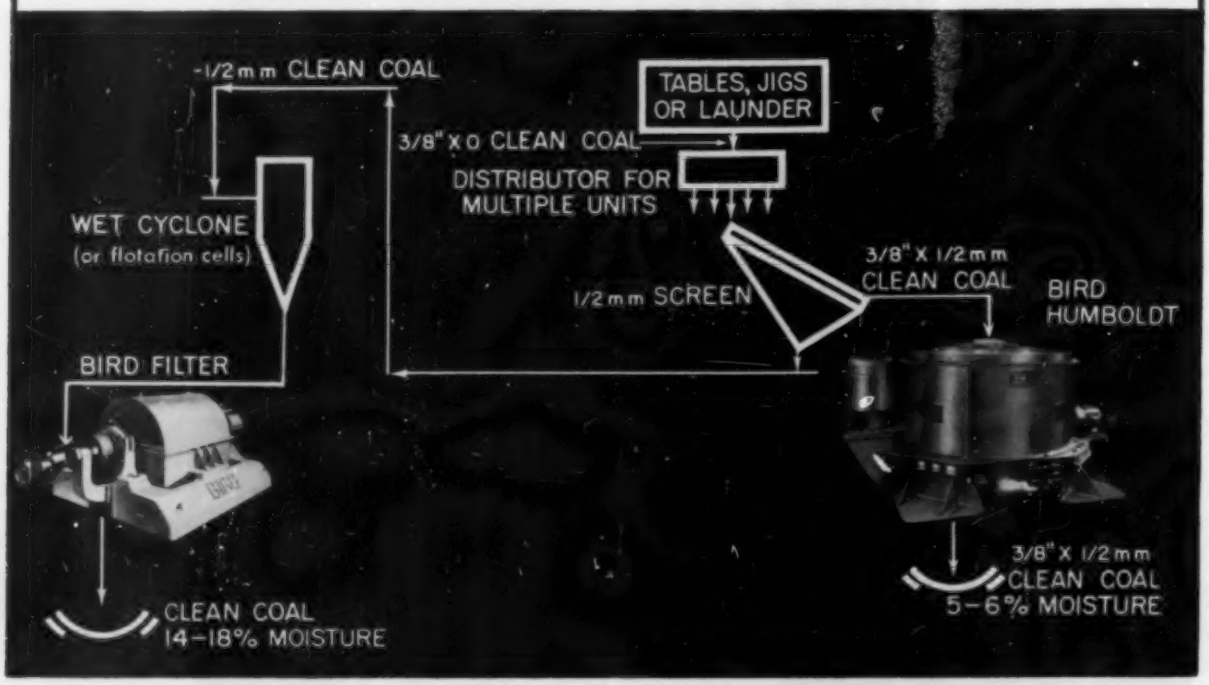
IN CANADA:

NATIONAL MINE SERVICE (CANADA) LIMITED
Elliot Lake, Ontario

Why Not

DEWATER YOUR FINE COAL

This Modern, Efficient, Economical Way


-1/2 mm CLEAN COAL
TABLES, JIGS OR LAUNDER
3/8" x 0 CLEAN COAL
DISTRIBUTOR FOR MULTIPLE UNITS
WET CYCLONE (or flotation cells)
3/8" x 1/2 mm CLEAN COAL
BIRD HUMBOLDT
1/2 mm SCREEN
BIRD FILTER
3/8" x 1/2 mm CLEAN COAL 5-6% MOISTURE
CLEAN COAL 14-18% MOISTURE

The Bird-Humboldt Centrifugal Coal Dryer takes the ⅜" x ½ mm coal from the dewatering screen and delivers it at 5% surface moisture or less, with almost no degradation or loss of coal. It uses less than 0.2 KWH per ton of dried coal. It runs up to 3000 hours or more without change of screens. Handling 75 to 80 tons per hour, cost, including amortization, operation and maintenance, is less than 5 cents per ton.

The Bird Solid Bowl Centrifugal Polisher gets the ½ mm fines drier than by any other mechanical means, at lowest cost per ton. High ash fines are removed in the effluent, if desired. The Bird Polisher quickly pays for itself out of the savings in cost of thermal drying.

Ask us to show you how these modern dewatering units fit into your preparation system and how much they will save.

BIRD MACHINE COMPANY • South Walpole, Mass.

BIRD MACHINE'S 50th YEAR OF SERVICE TO INDUSTRY

Regional Offices: **EVANSTON, ILLINOIS • ALAMO, CALIFORNIA • ATLANTA 9, GEORGIA**

THE BIRD POLISHER • THE BIRD HUMBOLDT

This Month in COAL AGE

DECEMBER 1959

Features This Month:

Editorials: Ultimate End; Mining Too ..... p 73
Fuel Cell Prospects and Coal ..... p 74
Mining at Loveridge ..... p 78
Preparation at Loveridge ..... p 92
New Seismic Technique Simplifies Strip Overburden Analysis ..... p 102
Operating Guide: Mine Storage of Coal ..... p 105
Maintenance Ideas ..... p 122
AC Cables for Coal (Part II) ..... p 128
Meetings Roundup ..... p 136

Departments This Month:

Coal Commentator . p 11 — News Roundup . . . p 26
Foremen's Forum . p 152 — Operating Ideas . . p 156
Equipment Developments . . . . p 160

► Power Generation

Fuel Cell Prospects and Coal ..... p 74

W. A. Raleigh Jr., Associate Editor, *Coal Age*

A firm upsurge in military and commercial interest is pushing the fuel cell to take over many jobs now done by heat engines and storage batteries. During the next 5 to 10 yr, chances are slim that the fuel cell will have appreciable impact on coal—either competitively, in generating central-station power, or consumptionwise, in use of coal as fuel. Beyond 1970, however, prospects for both should not be taken lightly. Progressive, research-minded companies will allow for the possibilities of "major breakthroughs" in fuel-cell technology which could bring competitive problems or consumption opportunities to coal's front door.

Featured—A Basic Type Fuel Cell: Operation and First U. S. Application.

► Continuous Mining

Mining at Loveridge ..... p 78

Developed to extract the 8-ft Pittsburgh seam at a rate of 5,000 tons of clean coal (15% reject) per shift three shifts per day, new Loveridge mine employs twin-head borers, pickup loaders, shuttle cars, and extensible and ropeframe conveyors to deliver coal to 20-ton mine cars via automatic transfer stations. With mine still in the development stage, maximum output of a single miner has been 760 tons of raw coal; of a pair working as a unit, 1,340 tons. Haulage is handled by 50-ton locomotives, and hoisting by 1,600-hp slope belt with a capacity of 1,680 tph at 625 fpm; belt lift is second highest in industry. Mining will be done full retreat from cross and panel entries turned from mains made up of eight intakes and eight returns and designed for maximum resistance to overburden pressure. Face operations are AC powered.

Ventilation Special—Air flow in entry development is up center and back along both sides to eliminate shuttle-car haulage through doors. The face problem is handled by a 1½-hp "diffuser" on the miner and two tubing lines on the opposite side to 5-hp exhausters.

► Preparation

Preparation at Loveridge ..... p 92

With a capacity of 5,000 tons of clean coal in 5 running hours per shift, Loveridge aims at 7% ash and 3% total moisture maximum, plus 13,600 Btu minimum. The coal, reduced to 5x0 on the bottom before hoisting and stored in a 15,000-ton open-topped hopper on the surface, is considered reasonably easy to clean. Reject runs 15%. Dual washing and tabling circuits are provided, with all 5x0 going through jigs, after which 3/16x0 is screened out for cleaning on double-deck table units. Drying equipment consists of centrifuges for 3/16x0, with flash equipment for all ⅜x0 and screen-type units for ⅜ up to 1¼.

Loveridge Accents—Cyclones rather than drag tanks for thickening prior to tabling.

No sheathing on dryer section except where wet coal is handled.

Control from three stations with three operators; loading of 15,000 tph at full capacity with approximately 40 man-shifts of labor.

Automatic samplers for raw coal and for all prepared coal under 1¼ in.

Closed water circuit—achieved with thickener and vacuum filters.

Automatic control of raw-coal feed rate.

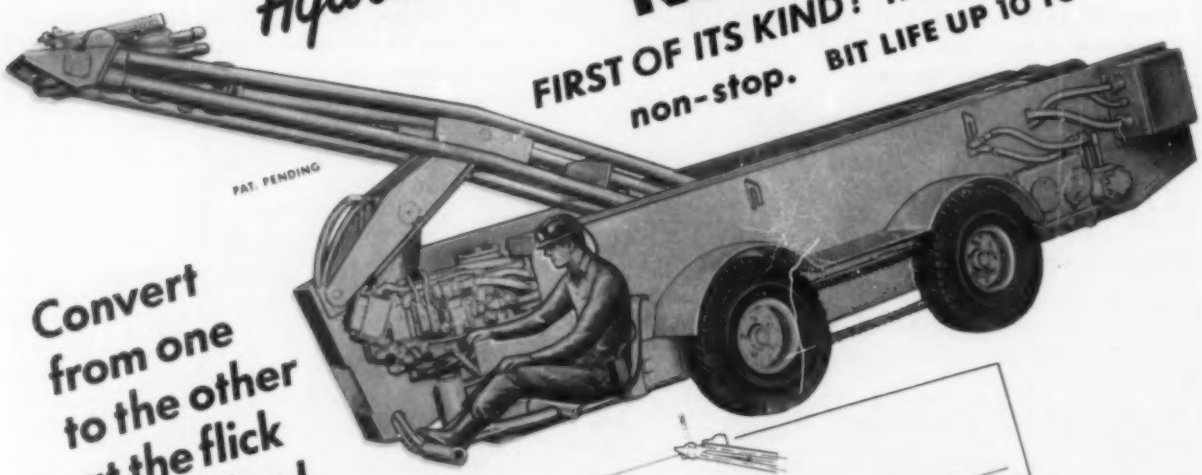
And in Addition—A bicycle for the car dropper to ease his trip back from the yard.

COAL AGE, December, 1959, Vol. 64, No. 12. Published monthly on the 1st by McGraw-Hill Publishing Co., Inc. Publication office, Third & Hunting Park Ave., Philadelphia 40, Pa. United States subscription rate for individuals in the field of the publication $3 per year; single copies $1. Second class postage paid at Philadelphia, Pa. For additional information see p. 9.
Postmaster: Please send Form 3579 to Coal Age, 330 W. 42nd St., New York 36, N. Y.

It's new, It's here- No-Air!

Galis "2 in 1" Hydraulic ROTARY-PERCUSSION Roof Drill

FIRST OF ITS KIND! It's push-valve, non-stop. BIT LIFE UP TO 1

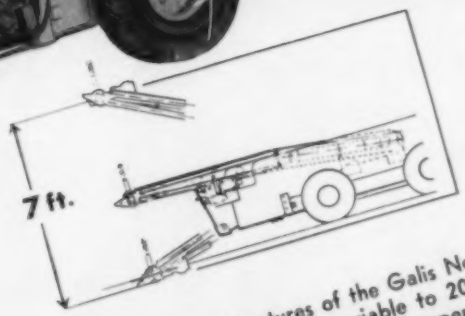


Convert from one to the other at the flick of a valve!

Again Galis pioneers the way and leads the field. The proven performance of the original Roofmaster has been expanded via rotary-percussion to eliminate pneumatic tools in your roof drilling.

Bit life has been extended drastically to permit economical drilling in the hardest of sandstones *without air!*

Variable thrust, torque and R.P.M. of drill plus variable percussive frequency and force will produce a best combination for maximum penetration in any rock formation. The rotary-percussion unit is adaptable to all Galis drills.



Some of the main features of the Galis No. 320 "2 in 1" . . . Tram speed, variable to 200 feet per minute, 4 wheel drive, 3 point suspension, 8 inch ground clearance allows negotiation of rough terrain. Crawler type maneuverability allows quick spotting of holes. "2 in 1" rotates about its own center of gravity. Has Bureau of Mines approved dust collecting system, by vacuum through hollow drill steel. All controls within easy reach of operator.

With the new Galis you start making important savings right away. Write for complete specifications.

Please send us literature on your Rock Duster, Portal Car, Roofmaster, and Utility Car.

Name _____

Street _____ Zone ____ State ____

City _____

Galis
ELECTRIC & MACHINE CO.
MORGANTOWN, W. VA.

Remember Galis for repairing and rebuilding all underground equipment. Phone-4668

► Stripping

New Seismic Technique Simplifies Strip Overburden Analysis ..... *p 102*

A quick, easy and inexpensive method of determining the consolidation of overburden in strip operations has been developed by Caterpillar Tractor Co. By this method the strip operator can determine rippability of the overburden, whether it can be dozed and scraper loaded; or if it must be drilled and blasted for handling by a shovel or dragline. A minimum of equipment is needed and two men can make a study in a matter of hours.

Key Points—How material is analyzed; how the system works.

► Operating Guide

Mine Storage of Coal ..... *p 105*

Present Practice—Mines representing about half the industry capacity store raw or prepared coal or both. Total storage capacity is about 4 million tons, or about 1½ days. About two-thirds of storage capacity is for prepared coal and 99% is on the ground. Around 15% of the raw-coal storage is in bins. Maximum reported bin or hopper capacity (raw coal) is 15,000 tons; maximum ground storage, again raw coal, 300,000 tons (240,000 tons for prepared).

Future Plans—Mines now storing either raw or prepared coal, plus a few not now in the business, plan to increase storage capacity (raw and prepared) about one-fifth in the future.

Bin and Hopper Storage—Provided for both storage and blending. Usually the bins are fed by conveyors, more frequently after preliminary crushing. Single-compartment units most common for raw storage and include a 15,000-ton open-top hopper fed by tripper belt. Multicompartment units almost universal for blending, and are employed to a limited extent for prepared sizes.

Ground Storage—Maximum in simplicity and flexibility secured by using trucks and bulldozers, or tractor or self-powered scrapers, etc. Front-end or tractor-mounted loaders are a popular means of reclaiming to trucks. Conveyor systems are growing in number and capacity, particularly where tonnages are large, with raw storage included permanently in the line of flow at an increasing number of properties. A growing number of properties also lay raw or prepared coal down over hoppers in the ground with feeders and collecting conveyors for reclamation.

► Maintenance Ideas

Reclaim Those Worn Hydraulic Parts ... *p 122*

Application of a new spraying process for reclaiming worn hydraulic components can save your company

This Month in COAL

1958 MATCH—The improvement in the bituminous production rate following the end of the steel strike now makes it likely that the final total for 1959 will be close to the 1958 figure of 410,446,000 tons. The anthracite rate improvement in December will still leave the industry short about 1½ million tons for the year.

Next Year?—A sizeable increase in bituminous output, with anthracite holding its own fairly well.

GAS FROM CANADA—Though coal and allied interests put up the best battle of their career, the FPC decision in early November approving the import of 204,000 MCF of natural gas per day from western Canada had long been foretold by the attitude of the commission and the temper of other governmental thinking. A permit from Canadian authorities is only a matter of time, at which point Canada will become a major factor in the U. S. energy picture. The decision adds force to coal's big argument for a definite national fuels policy: "A mistake today is not a matter of a few months or years. It can affect our future for a half century or more."

MORE RAW COAL?—The Peabody-TVA contract for 67 million tons of coal based on raw delivery directly from the pit, is viewed by many as accelerating a trend to use of raw coal by utilities with plants at or close to the mines. Even where cleaning is done for such plants there is a tendency to bypass ⅜- or ¼-in to cut the cost. Where complete raw delivery is the practice a major consideration is that no transportation or only a bare minimum need be paid on the extra inerts, and cleaning and drying costs are eliminated. Though the extra impurities increase burning cost somewhat, the utilities figure they're ahead.

IN CONTRAST—But while raw coal may be the answer for the mine-mouth utility or other major steam-plant operator, the picture is seen as quite different for smaller users which, in the aggregate, represent a considerable market. Such users normally can't handle trouble with coal as well as the bigger ones, and may, proportionally, be hurt much worse by trouble with steam-raising units. Thus, clean, uniform quality becomes a must for such users and their bigger brothers with long hauls from the mines. So, cleaning and its accompanying operations, as the continued high rate of contracts for facilities shows, will remain a major operating consideration for the indefinite future.

CROWDING ON—"All too little" is the way those on the firing line continue to categorize coal-industry activities in the stream-pollution field. At the same time public authorities crowd in on other fronts, as in Pennsylvania, where the ground may be being laid for adding bituminous mining to the list of occupations resulting in various forms of silicosis.

Forecast—More regulation in pollution, more liberality in state authorities in accepting new occupational diseases. The impact of these actions will be correspondingly less if coal moves to set its house in order where necessary, and keeps the merits of its case before the order-making authorities.

THE CABLE THAT LASTS LONGER... LASTS LONGER

BALANCED COMPOUNDING CURED IN LEAD

This headline is not meant to confuse you, but to point out that in spite of all of the claims you may hear about portable cable life, based on accelerated aging tests, true proof, as always, consists of *performance!*

The Tirex cable shown in the above illustration has been in service for more than fifteen years. During this time it has been dragged over rocks and sand. It has been flexed, stretched, immersed in oil and water; and crushed under the wheels of trucks and carts.

The fact that it has successfully resisted these abuses and is *still* operating is a tribute to the *Balanced Compounding* and *Cured-in-Lead* construction of its jacket.

Balanced Compounding and *Cured-in-Lead* construction assure you of maximum resistance to all of the factors which affect cable life. And there is no undue emphasis on any one factor at the expense of the others.

The record of performance achieved by Tirex Cables in installations all over the world is *proof* of the correctness of Simplex *Balanced Compounding.*

For complete information on Simplex Tirex Cables and Cords, get in touch with your nearest Simplex Distributor, or write directly to

Simplex
WIRE & CABLE COMPANY
79 Sidney Street, Cambridge, Massachusetts

considerable expense in rebuilding this equipment. This article tells you how the process works and also how it benefits you.

Other Maintenance Ideas

Fundamentals of Motor-Starter Design ..... p 123
Is the Power Really Off? ..... p 124
Connecting Single-Phase Transformers ..... p 125

► Electric Power

AC Cables for Coal . . .

Installation, Use, Maintenance ..... p 128

F. R. Hugus, Chief Electrical Engineer, Coal Machinery Div., Joy Mfg. Co., Franklin, Pa.

Part II of a two-part survey of types and applications of cables for AC service deals with installation of cables in boreholes and shafts, preservation of cables against damage and misuse and repair and splicing. Also included are instructions for testing splices, and descriptions of the various mechanical tests applied to cables.

D. C. McGRAW Jr., Publisher — IVAN A. GIVEN, Editor

Harold Davis, Managing Editor — A. E. Flowers, Associate Editor — W. A. Raleigh Jr., Associate Editor

Daniel Jackson Jr., Assistant Editor — Richard J. Taft, Assistant Editor — F. A. Zimmerli, Art Director

G. B. Bryant Jr., Washington — W. H. McNeal, Circulation Manager

Member of Associated Business Publications and Audit Bureau of Circulations

NEWS BUREAU OFFICES: Atlanta 3; Cleveland 15; Detroit 26; Houston 25; San Francisco 4; Washington 4.

WORLD NEWS OFFICES: London, Paris, Bonn, Tokyo, Bombay, Rio de Janeiro, Mexico City.

COAL AGE, VOLUME 64 — December 1959, NUMBER 12

COAL AGE, with which are consolidated The Colliery Engineer and Mines and Minerals, is published monthly on the 1st by McGraw-Hill Publishing Co., Inc. James H. McGraw (1860-1948) Founder. PUBLICATION OFFICE, Third & Hunting Park Ave., Philadelphia 40, Pa. See box below for directions regarding subscriptions and change of address.

EXECUTIVE, EDITORIAL, CIRCULATION AND ADVERTISING OFFICES, 330 West 42d St., New York 36, N. Y. Donald C. McGraw, president; Joseph A. Gerardi, executive vice president; L. Keith Goodrich, vice president and treasurer; John J. Cook, secretary. Officers of the Publications Division: Nelson Bond, president; Harry L. Waddell, senior vice president; John R. Callaham, vice president and editorial director; Joseph H. Allen, vice president and director of advertising sales; A. R. Venezian, vice president and circulation coordinator.

Subscriptions are solicited only from executives, management, engineering, operating and supervisory officials associated with companies engaged in the mining and preparation of anthracite, bituminous and lignite coal. Position and company connection must be indicated on the subscription orders. Send to address shown in the box below.

U. S. and possessions and Canada, subscription rate for individual in the field of the publication $3 per year, single copies $1; elsewhere $15 per year, payable in advance. Single copies $2. Second-class mail postage paid at Philadelphia, Pa. Printed in the U. S. A. Title registered in U.S. Patent Office. © Copyrighted 1959 McGraw-Hill Publishing Co. All rights reserved. Our primary aim is to provide subscribers with a useful and valuable publication. Your comments and suggestions for improvement are encouraged and will be most welcome. The publisher, upon direct request from any subscriber to our New York office, agrees to refund the part of the subscription price applying to copies not yet mailed.
COAL AGE articles are indexed by Engineering Index. Coal Age's own index is published annually in the December issue.

SUBSCRIPTIONS: Send subscription correspondence and change of address to Fulfillment Manager COAL AGE, 330 West 42nd St., New York 36, N. Y. Subscribers should notify Fulfillment Manager promptly of any change of address, giving old as well as new address and including postal zone number, if any (official post office request). If possible, enclose an address label from a recent issue of the magazine. Since copies are addressed one to two issues in advance, please allow one month for change to become effective.

This Month in Mining Practice

CYCLONE CLEANING—With units now either going into service or on the verge of it, cyclone cleaning of fines now is becoming an actuality in the U. S. The scope and costs of such cleaning are yet to be ascertained, but experience abroad provides reason to believe that results will be quite favorable. Proponents see one application as the sole cleaning unit in a plant where all coal would be crushed to, say, minus ¾ in for, say, metallurgical or power-plant use. Certainly it seems to have an active future as another in the growing list of fine-coal cleaners.

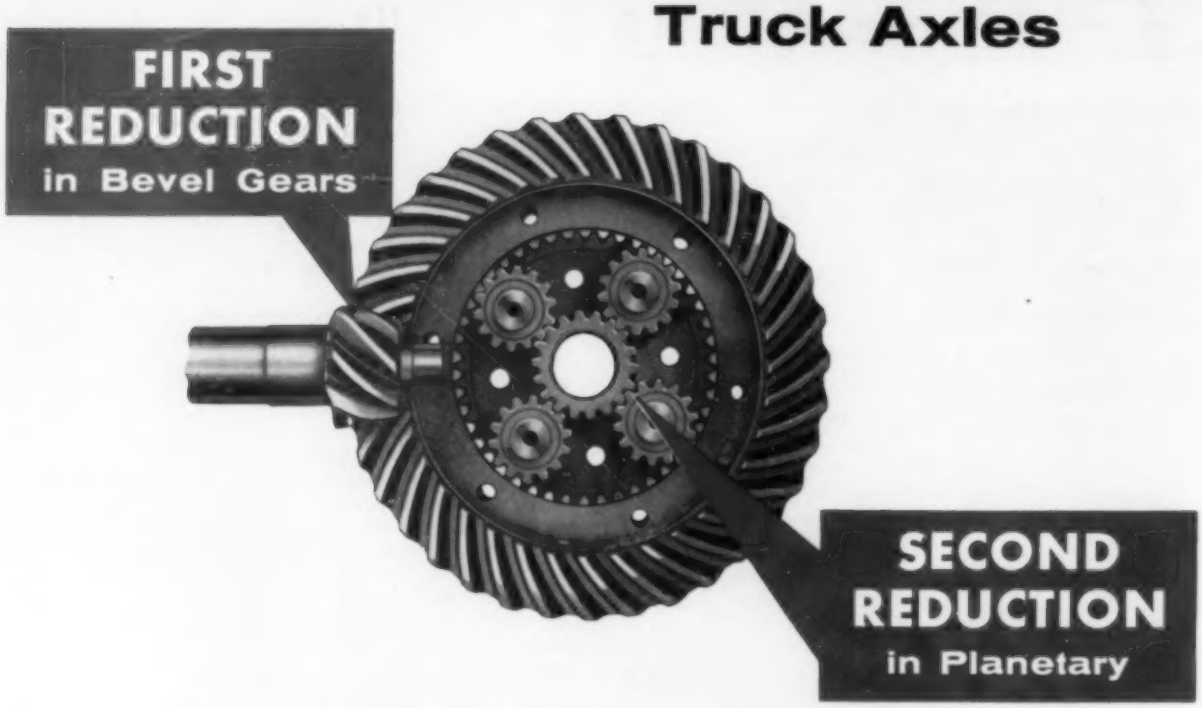
HAULAGE HELPS—Rail haulage, despite such exceptions as a new belt system that ultimately will reach more than 5 mi, continues to lead the mainline field. Reasons include big cars, big locomotives, good track and good traffic control. But these in turn bring up new problems, and accentuate others, such as, tread and flange wear, and so on. Thus attention is being increasingly devoted to these "simpler" things, resulting in such developments as flange oilers, pressed-on tires, switch-point protectors, alloy frogs and others. The benefits in reduced parts replacement, fewer wrecks and the like are considerable.

MECHANIZED MIXING—Latest estimates put the use of ammonium nitrate for blasting at 280 million lb per year—and new developments and improvements in its use are a frequent occurrence. For example, as a further step in saving labor and mechanizing its use, mixing with oil is done in a standard portable concrete mixer. And for the maximum in safety, voluntary standards for the handling of field-mixed nitrate are now in the process of formulation and probably will be finally adopted in 1960. Meantime, use of ammonium nitrate continues to climb.

PILLARING HELP—Practically all mining men who have had anything to do with pillar extraction have encountered from time to time a block that was impossible to drive through. Under the British "pressure-arch" theory, the explanation is that the block was subjected to the cumulative stresses of the concentration of up to three different strata loads, thus making it possible to keep places open. Considerable work is being done on the application of the theory to U. S. mining, and some properties have established or changed projections to conform to it. Their experience so far indicates that there is a very real possibility of very real benefits.

FIRE-RESISTANT FLUIDS—Some 14 million gal of hydraulic fluid is used per year in some 15,000 equipment units in coal—all petroleum-based until recently. Now fire-resistant fluids are undergoing their initial tests in several properties, with the expectation that eventually, as a result of voluntary acceptance or order, they will replace the original type. Results so far indicate that the fire-resistant fluids can do the operating job, though there still are problems. It is hoped that the extra cost, running 1c or more per ton in some instances, can be reduced.

A New Concept in Double Reduction Truck Axles



Eaton Planetary Double Reduction

Gives You these Important Benefits!

Save Weight—Size for size, Eaton PDR Axles weigh less than conventional herringbone or spur gear axles, permit truckers to haul more legal payload.

Last Longer—In Eaton PDR Axles, gear tooth loads are equally distributed over four rugged "planet" gears; stress and wear are reduced, resulting in materially longer axle life. Eaton's forced-flow lubricating system provides positive lubrication to all moving parts, even at slowest vehicle speeds—a feature not available in other double reduction axles.

Cost Less to Maintain—When and if repairs are necessary, parts are readily available—most of them interchangeable with other Eaton Axles. Simple construction—similar to the famous Eaton 2-Speed Axle, with which all truck service men are familiar—holds maintenance labor to a minimum.

Previously, double-reduction axles have been available only in the extra heavy-duty sizes. Eaton PDR Axles are available in a wide range of sizes—the last word in equipment to meet the demands of today's hauling conditions. By actual comparison they cost less to buy, less to maintain. They have established outstanding performance records in all types of heavy-duty operation.

EATON

Ask your Truck Dealer for Complete Information about Eaton PDR Axles

EATON AXLE DIVISION
MANUFACTURING COMPANY
CLEVELAND, OHIO

The Coal Commentator

Muckles From Mickles

"Many a mickle," as the Scottish saying is alleged to go, "makes a muckle." Of course there's a lot to the basic idea wherever it is applied, including labor saving in coal mining.

The big machines costing in the hundreds of thousands and millions are the first things thought of in keeping coal's cost down—and rightly so. But coal can never reach its goal of "laborless" operation without some developments to back up the big labor savers. These developments may be the utmost in simplicity—for example, as at Loveridge mine in northern West Virginia, providing the car dropper with a bicycle to eliminate the long trudge back from the lower end of the yard in favor of a short breeze on the wheel.

Moral: Give the big things the attention they rightly deserve—but don't overlook the simpler approaches to saving labor. The maximum can be achieved only when the entire waterfront is covered.

Meetings Season

This month's issue of *Coal Age* is distinguished, in addition to the fuel-cell study, the Loveridge story and *Coal Age's* Operating Guide on "Mine Storage of Coal," by a series of five reports on meetings of coal organizations dealing with mining, safety and utilization.

The editors of *Coal Age* attempt to cover every significant meeting. Why? The answer is the vast flow of knowledge that these meetings bring forth. This flow has been increasing in both quantity and quality in late years, and with it the opportunity to exchange ideas informally in addition to the formal sessions.

Recommendation: Plan to take advantage of the opportunities to the fullest extent possible. And if you can't make some meetings, check the *Coal Age* reports for down-to-earth summaries of the proceedings.

Closer Still

Though the rate is a long way under that of a few years ago, new mines still are being opened and others are in the planning stage.

Aside from reflecting the basic good health of the industry new mines mirror the advancements in production equipment and techniques, whether underground or strip, though they have no monopoly on coming up with the new in mining, preparation and services. In stripping, as an example of new mine contributions, equipment reportedly being considered for one operation would be the first of the "100" class—a 100 cu yd shovel and 100-ton or heavier trucks. And the extension of stripping to include supplemental underground recovery will continue to provide the opportunities for testing remotely controlled mining units, pending a design that can be taken underground.

So, the new mines deserve watching because of the way they point up advances in equipment and techniques—along with their older predecessors undergoing modernization to keep them likewise efficient and profitable.

Realism on Russia

Perhaps the growing preoccupation with Russian plans and achievements is justified but at times it seems to your commentator that the citizens of the U.S. are expected to reach for the cold-preventer everytime a Russian sneezes. This is not to say that the U.S. should not keep a wary eye out or should fail to keep track of Russian technical and economic developments. But is it necessary to feel that a race is mandatory, and consequently that we must strive to keep ahead whether it fits in with our own natural scheme of development or not?

Russia has made strides and will make more, but she is not necessarily superior to the U.S. now and never will be in all things. By the same token the U.S. will not necessarily be superior to Russia in all things, nor need we be if we are realistic. Russia has profited from developments in the U.S. and the U.S. should plan on profiting from such Russian developments as will fit the U.S. situation, and should strive only for superiority in the military sense for as long as it may seem necessary. **Riding off in all directions to try to keep ahead in everything is scarcely the way to insure orderly and maximum progress on our part.**

Not Yet

"Don't count us out of the coal-hauling picture yet!" That is more and more the railroad rallying cry.

The greater rate-making freedom now in the offing is a major factor in greater railroad-executive confidence in their coal-hauling future, coupled with their growing disposition to use this power and other weapons at their command to get and retain business, particularly coal business. All this, of course, is grist to the coal man's mill since any contributions to reduced delivery charges means a more impregnable competitive position against other fuels. Thus it is a development that coal can encourage by active cooperation. The immediate benefit is a better chance at available markets. A longer-range one is a bigger customer when coal goes back—as coal or in some other form—as a locomotive fuel.

Keep your eye on KOEHRING WORK CAPACITY

A heavy-duty team —
Owner of this limestone quarry has standardized on Koehring® equipment for both excavating *and* hauling. Blasted rock is loaded out by 1-yard 405 shovel —and hauled to crusher in 6-yd. Koehring Dumptors.

Loading RR cars —
stockpiling, lifting 22-ton crusher into place, erecting plant, feeding hoppers in the pit — busy Koehring 805 is a jack-of-all-trades around this gravel plant. Capacities: 2 to 3-yard clamshell or dragline, 52-ton lift crane — converts to 2-yard shovel.

Rock-buster —
Swinging a skull-cracker in stone quarry, a 15-ton 305 crane pulverizes oversize slabs and chunks of blasted rock. A popular size in mines, quarries, the 305 is available on 3 types of mountings: crawlers, truck, self-propelled Cruiser®.

High-lift stripper —
at this coal mine has 1½ yd. dipper on 28-ft. high-lift boom. Work range: 34 ft.-4 in. cutting height and 25-ft.-9 in. dumping height at 45° boom angle. It's a Koehring 605. Also available with 1½-yd. dipper on standard 22-ft. heavy-rock shovel boom.

Deep-pit specialist
This high-lift 1205 puts deep stripping on a long-reach basis: 51 ft.-4 in. cutting height with 2½-yd. dipper on 50-ft. boom (at 45° angle). Or, with 3-yd. dipper on 40-ft. high-lift boom, big Koehring 1205 cuts bank face at heights up to 42 ft.-10 inches.

Plenty of pick-up —
Unloading and installing heavy, bulky machinery is no problem with a Koehring 545 truck crane on hand. How much will it lift? Up to 45 tons, with 40-foot boom at 15-foot radius!

Stripping 30 feet of overburden from coal deposits, Koehring 1205 dragline swings big bucket over a wide work radius. Bucket sizes on the big 1205 range from 3 to 4 yards — and boom lengths from 60 to 170 feet, depending on weight of materials. Yet, operator handles it with light lever-pull (90% power-assist on main drum clutches). Retains sensitive "feel" of load. 360° full-revolving fairlead maintains true cable lead at any pull angle on bucket. 1205 converts to clamshell, 95-ton crane, 3-yard shovel (standard or high-lift). Call your Koehring distributor for complete details on this, and all other sizes.

KOEHRING

DIVISION OF KOEHRING COMPANY

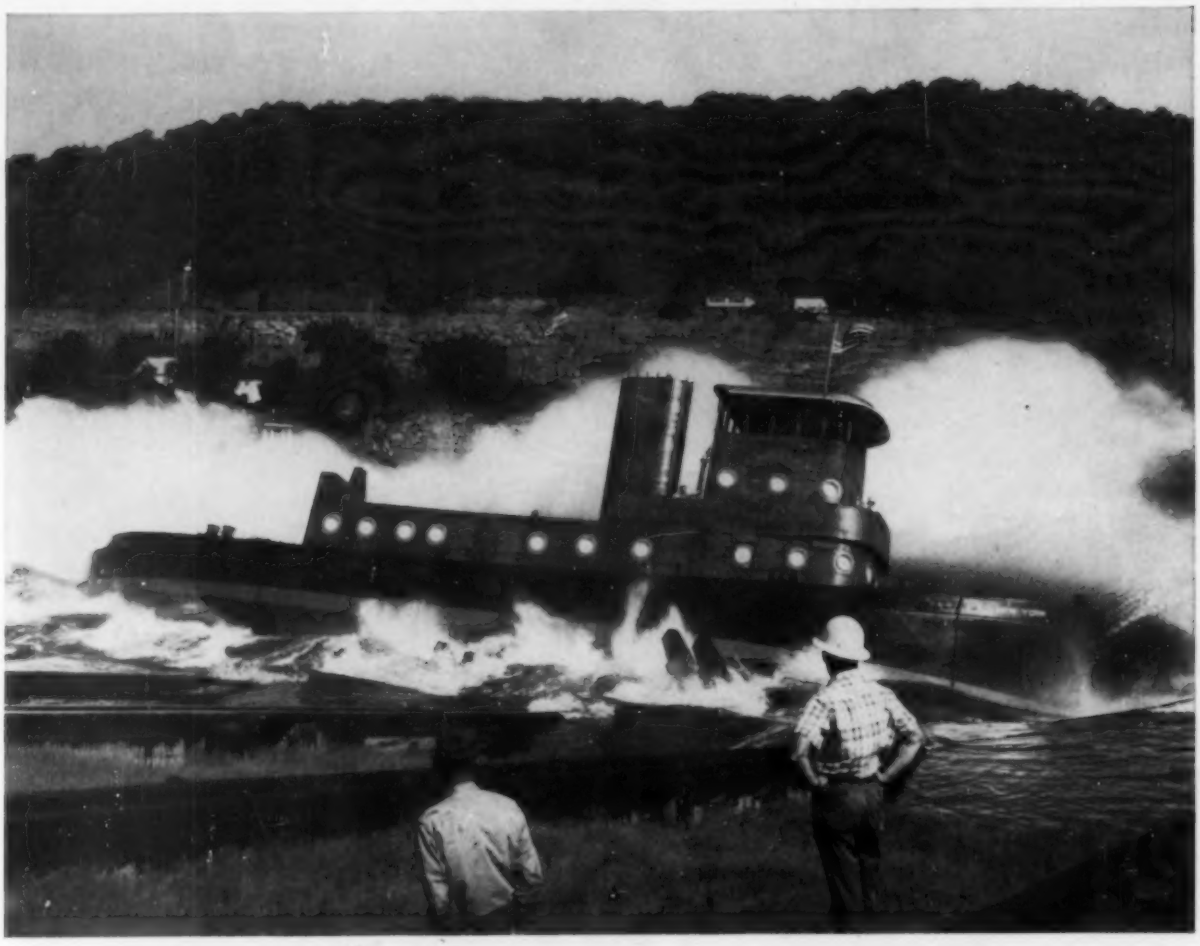
Milwaukee 16, Wisconsin

Koehring excavators, cranes also manufactured in: ENGLAND • SPAIN • JAPAN

In Canada: KOEHRING-WATEROUS LTD. Brantford, Ontario

SKOOPER solves split coal vein problem — In this Iowa coal mining operation, top seam of good quality bituminous coal was separated from bottom seam by a 2-inch layer of fire clay. Conventional shovel loaders mixed clay in with coal, causing too high an ash content. Solution: Koehring 205 Skooper! Its 7-foot level crowd took off the top coal seam clean, fast, without mixing in clay. No ground-grinding, skid-turn action of tractor loaders either, because full revolving Skooper swings through complete loading cycles without track movement. *There's nothing like it on wheels or tracks!*

KOEHRING SKOOPER



TUGBOATS!

Dravo builds seven tugboats for Pennsylvania Railroad

The first of seven Pennsylvania Railroad tugboats, the *New York*, is shown being launched at Dravo's Neville Island shipyard. These tugs will complete the modernization of the PRR's New York Harbor fleet. Built to the General Managers Association design and specifications, developed specially for the severe railroad service of towing carfloats, barges and lighters, all seven are single-screw, 1200-hp, powered by a Cleveland Diesel 12-567C engine equipped with reverse reduction gear and Wichita clutch. Dimensions are 105′x26′x13′8″. For full information on how Dravo's complete marine facilities can furnish you with quality tugboats, towboats and barges, contact Dravo Corporation, Pittsburgh 25, Pa.

DRAVO
CORPORATION

"I call Bethlehem when I need track spikes fast. They carry all standard sizes in stock, ready to go at a moment's notice."

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

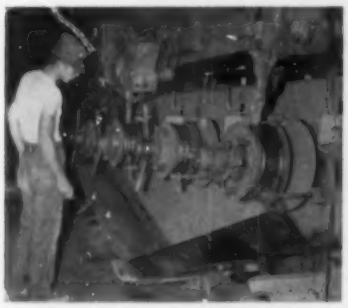
Increase the life of your wheels with S-D Hard-Faced Treads and Flanges...

"Modern mass-production equipment has catapulted Sanford-Day into the position of top mine wheel 'rehabilitation center' of the country."

—Fusion Facts

Why you save on S-D Hard-Faced Wheels (New or Reclaimed)

For years wheels like the one at right had to be discarded. Its (1) Tread and (2) Flange are "worn-out". But otherwise the wheel is as sound and serviceable as a new one. We have solved the problem of getting **wearing material** on a wheel where it does some good . . . **on the tread and flange where it is used!** We have reclaimed thousands upon thousands of "worn" wheels by successfully applying high alloy materials to the tread and flange of discarded wheels. These reclaimed wheels have earned such favorable savings, and due to oftentimes tripling their service life, many users have been ordering **new wheels** S-D Hard-Faced. They save the cost and down time of changing and reclaiming wheels when ordinary wheel flange and tread wear out.



Several completely automatic fixtures, such as this one, were developed at Sanford-Day in cooperation with the welding industry to mass-produce S-D Hard-Faced new wheels and reclaim old ones. Heads are shown here depositing high alloy on treads. A different alloy is used on flanges. Secret of long wheel life is obtaining wheels furnished with wearing surface on treads to take "impact", while wearing surface on flanges will take "scrubbing". S-D Hard-Facing assures you maximum and equal service of both tread and flange!

What counts is the proper alloy on the tread and flange! Over given period of time your wheel requirements will be reduced substantially when you order and use S-D Hard-Faced Wheels. Write us today for BULLETIN E-100 that furnishes complete information and specifications. **Sanford-Day Iron Works, Inc., P. O. Box 1511 . . . Telephone 3-4191, Knoxville, Tennessee.**

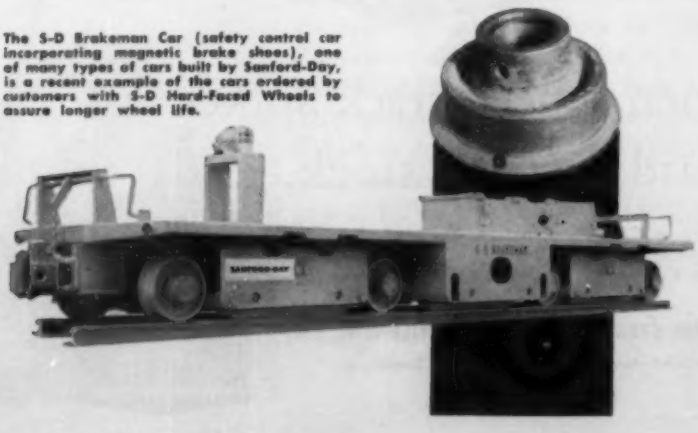
Worn wheel above shows typical condition of wheels formerly discarded.
Field reports and customer experiences with S-D Hard-Faced Wheels show that reclaimed wheels, like one below, often give three times the service life of unprotected ones at far less than new part cost.

SANFORD-DAY

KNOXVILLE TENNESSEE

Pictured below is a test wheel after many months service in severe service. It shows no appreciable wear on the S-D Hard-Faced tread and flange.

The S-D Brakeman Car (safety control car incorporating magnetic brake shoes), one of many types of cars built by Sanford-Day, is a recent example of the cars ordered by customers with S-D Hard-Faced Wheels to assure longer wheel life.



Cleaner, cooler operation . . . less maintenance . . . longer, trouble-free life

HERE'S WHY: Ordinary d-c motor ventilation systems draw air in at the commutator end, contaminate windings by drawing carbon dust from commutator brush wear *into* the machine. In the new Life-Line® "H," this air flow is reversed. Air and carbon dust are expelled at commutator end . . . assuring cleaner, cooler windings . . . longer motor life . . . less maintenance.

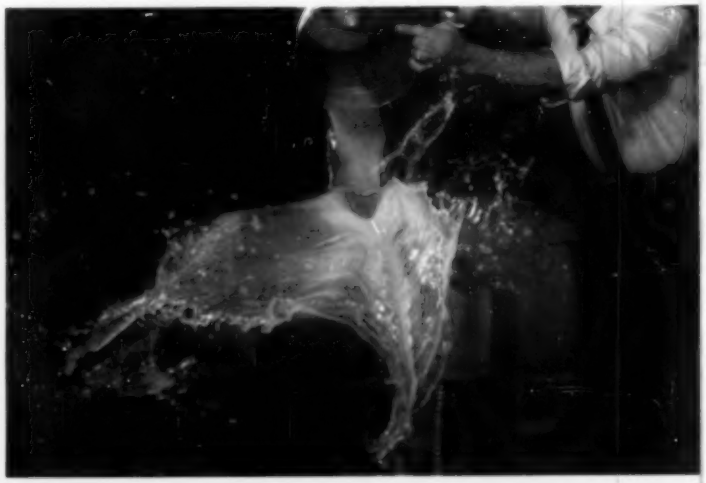
Plus . . . these other important advantages .....

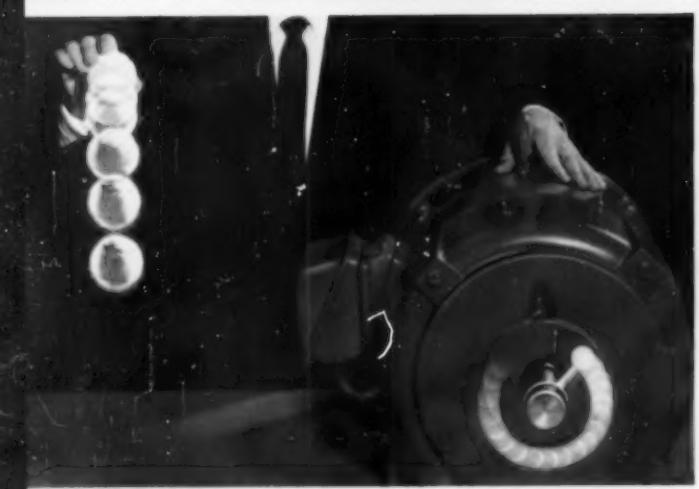
YOU CAN BE SURE...IF IT'S Westinghouse

These exclusive features of the new Westinghouse Life-Line H d-c motor guarantee top performance . . . longer, trouble-free life

TEN TIMES LONGER INSULATION LIFE . . . New silicone insulation in Westinghouse Life-Line® "H" d-c motors and generators stands up under temperatures which turn ordinary insulation to a cinder. High-temperature silicone insulation is used with the full complement of iron and copper required for low Class B temperature. Result: Life-Line "H" shrugs off emergency overloads and abnormal ambients to keep production rolling, maintenance down.

GREATER PROTECTION . . . most complete and advanced protection available in dripproof industrial d-c machines. Elimination of uncovered side openings . . . heavy, cast end brackets . . . effective seals throughout . . . all combine to provide outstanding resistance to liquids, vapors and dirt. This means longer life with greater reliability . . . minimum maintenance under all operating conditions.



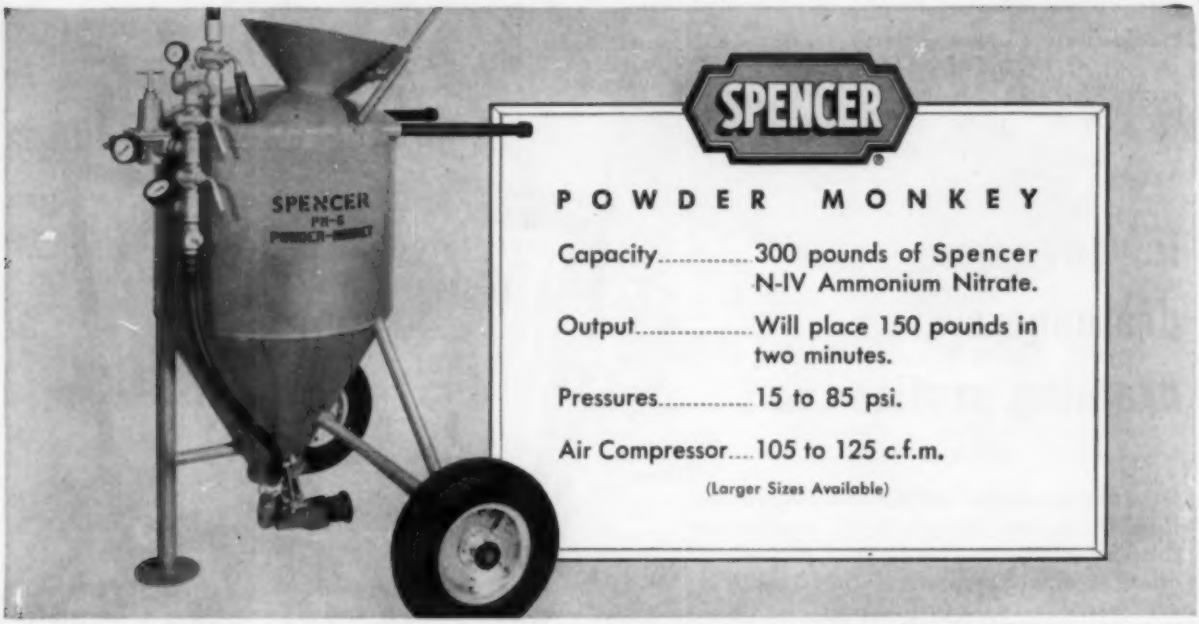


FASTEST RESPONSE . . . 35 per cent increase in commutating ability . . . up to 55 per cent lower mechanical inertia . . . and up to 30 per cent reduction in electrical inertia mean that the new Westinghouse Life-Line "H" d-c motor provides the fastest acceleration, quickest reversing and closest speed regulation. This means more production, better product quality, minimum complexity of control.

SIMPLIFIED MAINTENANCE . . . With the new Life-Line "H," maintenance is not only substantially reduced but periodic inspections are also greatly simplified. For example: as shown above, Uniforce brushholder fingers lock out . . . brushes can be inspected or changed with one hand. And Uniforce tension remains constant throughout brush life . . . no need to adjust pressure as brushes wear.

For information about the ways you can profitably put the new Life-Line "H" motor to work, contact your nearby Westinghouse representative. Or, write Westinghouse Electric Corporation, P. O. Box 868, 3 Gateway Center, Pittsburgh 30, Pa. JI-22122

YOU CAN BE SURE... IF IT'S Westinghouse


SPENCER
SPENCER
POWDER MONKEY
Capacity..... 300 pounds of Spencer N-IV Ammonium Nitrate.
Output..... Will place 150 pounds in two minutes.
Pressures..... 15 to 85 psi.
Air Compressor.... 105 to 125 c.f.m.
(Larger Sizes Available)

One man is all it takes to fill horizontal holes with Spencer N-IV Ammonium Nitrate for blasting, when you use the new Spencer Powder Monkey. Available with wheels for towing, or mount on powder truck.

At Last! A Machine For Fast, Easy Placement Of Ammonium Nitrate In Horizontal Blast Holes:

New Spencer Powder Monkey saves you $3.00 to $4.00 per 100 pounds on bag costs alone!

Scientifically designed for placement of Spencer N-IV Ammonium Nitrate in horizontal blast holes, the Spencer Powder Monkey *blows* the prills into the hole. Then the Powder Monkey is filled with sand, which is blown into the holes for stemming.

There's no need for tamping bags, tamping equipment, or the labor needed to fill and tamp bags into the hole!

With the Powder Monkey, you can actually load faster and more economically than with any other known method! Job-tested on holes ranging from 1⅝ inches to 8 inches in diameter, the Powder Monkey has proved itself under a wide variety of conditions.

Another advantage of placing Spencer N-IV with the Powder Monkey is that you can prime the entire charge with detonating cord at the same time you insert the hose in the blast hole for filling.

World's Most Efficient Low-Cost Explosive

Spencer N-IV Ammonium Nitrate produces a superior blast for two reasons: (1) Spencer N-IV has a special structure that lets the prills absorb oil more easily. (2) Spencer N-IV contains a much higher percentage of ammonium nitrate than other brands.

Because of these two advantages, Spencer N-IV produces more energy than competitive grades of ammonium nitrate, yet costs no more!

How N-IV Reduces Priming Costs

With Spencer N-IV, you save on priming costs, too, because it can be initiated with a single strand of 175-grain detonating cord. And you put an end to the danger of storing high explosives on the job site!

Spencer N-IV is available in all-plastic 50-pound bags that are tougher than paper—so tough they reduce breakage as much as 50%. They are so weather-proof you can store them right out in the open! (Also available in paper bags.)

For more information on Spencer N-IV Ammonium Nitrate, or the new Spencer Powder Monkey, tear off and mail the coupon below:

SPENCER

Spencer Chemical Company
401 Dwight Building
Kansas City 5, Missouri

Yes! I want to know more about:

☐ Spencer Powder Monkey
☐ Spencer N-IV Ammonium Nitrate

Please rush information!

Name_____

Firm_____

Address_____

City_____ State_____

This seal of the National Sanitation Foundation means Tested...Approved...Sanitary

Is your mine drainage system draining profits too?

Or have you installed USS National Polyethylene Pipe? If you have, then you're not troubled with corrosive mine water slowing work progress and eating at your equipment.

USS National Polyethylene Pipe is the answer to mine drainage problems; it resists attack from corrosive mine water, acids, alkalies, salts, and other mine chemicals. And no more costly pipe replacement—it's made to last.

Abnormal mine temperatures won't crack Polyethylene Pipe, even at degrees down to —90°F., and up to +120°F. It's light, easy to install, and flexible enough to turn corners and go over and under obstructions.

You can buy USS National Polyethylene Pipe from ½ inch to 6 inches in diameter, and in a variety of wall thicknesses. For complete details, write to National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

The world's largest and most experienced manufacturer of tubular products.

USS and National are registered trademarks

USS National Polyethylene Pipe

USS National Tube Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Export Company, New York

Announcing 3 NEW CARMET Mine-Tested Cutter Bits

Here's a trio of precision-made cutter bits, proven in operation to give long service under tough mining conditions. Your Carmet distributor carries them, and cutter bits for every mining operation, in stock. Check with him now.

Carmet JC Style Colmol and Boring Bit

Note the collar support that prevents bit block from splitting. Shank is forged from high-alloy heat-treated steel. Tough, hard, wear-resistant carbide tip is double-bonded by mechanical cap. Long operating life under all conditions.

Carmet JR Style Cylindrical Bit

Another new outstanding Carmet bit for use on all cutting machines and continuous miners. Tip is embossed in high alloy heat-treated steel.

Carmet GV Style Bit for Joy Cutter Chain

Designed with husky bull-neck for use on Joy GV-6111 cutter chain. Style GVR has drilled carbide insert brazed into shank for maximum support. GV series available with double-bonded insert brazed to milled shank.

New Carmet Mining Tool Catalog Now Available From Your Carmet Distributor

Brace-Mueller-Huntley, Incorporated
Offices: Buffalo, Rochester & Syracuse, New York
Carbon Transfer & Supply Co., Helper, Utah
Carlsbad Supply Company, Carlsbad, New Mexico
Consolidated Supply Co., Picher, Oklahoma
Crandall Engineering Co., Inc., Birmingham, Alabama
Gladstein Company, McAlester, Oklahoma
Marion Mine & Mill Supply Co., Whitewall, Tennessee
McCombs Supply Company, Jellico, Tennessee
McCombs Supply Company, Harlan, Kentucky
Oglebay, Norton Mine Supply Division
Offices: St. Clairsville, Ohio & Johnstown, Pa.
Persinger Supply Company, Williamson, West Virginia
Persinger's Inc., Charleston, West Virginia
Union Supply Company, Denver, Colorado
U.S. Steel Supply Company, Pittsburgh, Pennsylvania
W.B. Thompson Company, Iron Mountain, Michigan
Vanguard Equipment & Supply, Chicago, Illinois
C. F. Ghorst Supply Co., Terra Haute, Indiana
Bluefield Hardware Co., Bluefield, West Virginia

Revised 5th edition contains application data and specs on full Carmet Mining Tool line, including sections on grinding and reconditioning. For your copy, see your distributor or write Carmet Division, Allegheny Ludlum Steel Corp., Detroit 20, Michigan.

ADDRESS DEPT. CA-24

WSW 7591

CARMET

CEMENTED CARBIDE DIVISION OF
ALLEGHENY LUDLUM STEEL CORPORATION

AL

Have you checked these three
REPUBLIC MINE ROOF

✔ PRECISION-TAPERED PLUG

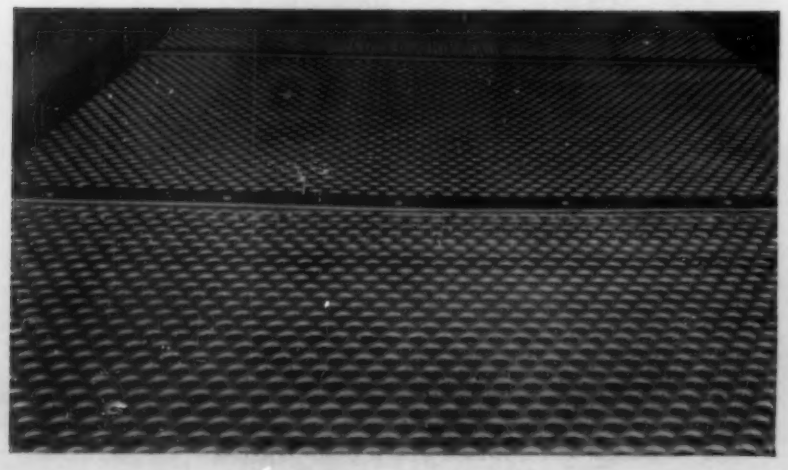
Engineered for proper shell expansion. Note angle of taper in illustration—the precise degree required for strength, dependability, and quick efficient tightening. This improved Republic plug is versatile and adaptable, and is particularly effective in relatively soft formations.

✔ HEAVY-DUTY SUPPORT NUT

Square nut provides over 40% better support than even the best previous method, yet maintains proper bolt tension by stripping at approximately 50 pounds torque with no damage to bolt threads. Here's another point: nut can be applied either side up to expedite assembly.

REPUBLIC ELECTRUNITE GROOVED-END TUBING offers cost-saving, time-saving advantages in many mining applications. It is quickly and easily joined with Victaulic Couplings. Portable field grooving equipment is available, too. Grooved-End Tubing is ideal for air, water, drainage lines, tunneling, and other heavy duty operations. As work moves ahead, lines can be taken up and relaid to conform with changing needs. Strong, rugged; engineered and produced to meet severe laying conditions. Send coupon.

SUPERIOR STRENGTH PLUS CORROSION-RESISTANCE are two of the many features of Republic High Strength Steel which make it ideal for a wide variety of mine industry applications. In mine car and hopper car use, for example, these factors contribute to greatly reduced maintenance. Republic High Strength Steel also provides good impact and abrasion-resistance. It will pay you to evaluate all of these advantages in terms of your equipment performance specifications. For more information, mail coupon.



SUPERIOR PERFORMANCE OF REPUBLIC ENDURO® STAINLESS STEEL used for this cleaning plant shaker screen has drastically reduced replacement expense. Reason is the excellent resistance of Republic Stainless to abrasion and corrosion. Other characteristics which pay service dividends in mine equipment applications include its good strength-to-weight ratio, easy cleanability, and high impact strength. In addition, Republic Stainless Steel is readily formed and welded, simplifying both manufacturing and maintenance operations. Mail coupon.

advancements in BOLTS?

✓ IMPROVED SELF-CENTERING HEAD

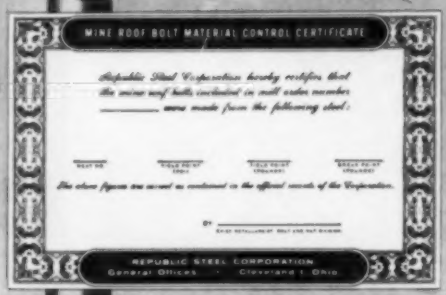
Compact, one-piece head eliminates need for second washer. Heavy flange, and thick, reinforced washer are guided cleanly and firmly into position in bolt plate. Entire unit forged, for ruggedness and strength. Standard 1⅛" head available with ¾" and ⅞" bolt sizes.

✓ CHECK THE COMPLETE UNIT

Can be shipped fully assembled as shown here

. . . to prevent loss of parts, prevent damage to bolt threads, save you assembly costs. Improved Republic RS-1 Expansion Shell, shown, provides extra strength, easy installation, in strata of any type.

Specify Republic Roof Bolt Plates, Too!



MATERIAL CONTROL CERTIFICATE with every Republic Roof Bolt shipment gives specific physical properties of steel used. Data includes yield point in pounds per square inch, yield and break point in pounds, and steel heat number. Guesswork about performance is eliminated!

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. CA-8119-R
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

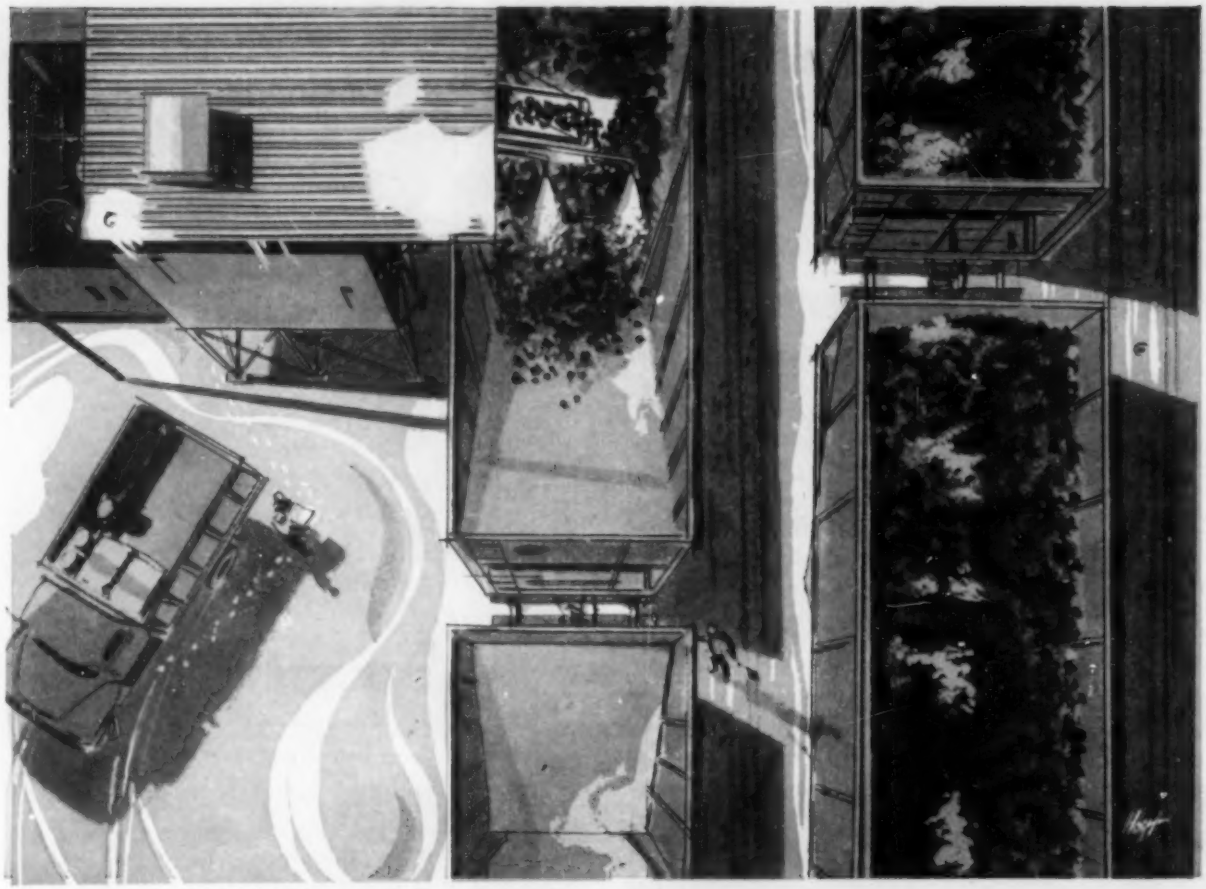
Please send more information on:
- ☐ Mine Roof Bolts
- ☐ High Strength Steel
- ☐ Stainless Steel
- ☐ ELECTRUNITE® Grooved-End Tubing

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____



New Morton "Formula 5" with rust inhibitor protects your coal and your equipment

Now more economical than ever to use!

"Formula 5" is the safest, most effective freezeproofing compound you can buy. It is specially made to meet the requirements set up by coal producers. "Formula 5" features a rust inhibitor and a new easily distinguishable blue color.

Unlike ordinary freezeproofing compounds "Formula 5" has a rust inhibitor added to protect you and your customers against corrosion of cars, motors, conveyors and other equipment.

Effective even at sub-zero temperatures, "Formula 5" not only keeps coal free-running for your customers, it also is ideal for use anywhere around your mine where icing is a problem.

"Formula 5" is easy and economical to use.

In addition to being a multi-purpose freezeproofing compound, "Formula 5" needs no mixing, no special handling. It won't cause costly delays by caking or lumping in feeders. It's a free-flowing product composed of chemically treated sodium chloride (30-70 mesh) and a special, new improved anti-corrosive compound. Just apply dry, direct to coal.

"Formula 5" is treated to produce an ideal dissolving rate so that little of it is lost during initial drainage. This means more effective, more economical freezeproofing.

Send for free booklet, "The Key To Low Cost Effective Freezeproofing." If you would also like a Morton Consulting Engineer to assist you with freezeproofing and equipment maintenance problems, without cost or obligation, write:

MORTON SALT COMPANY
INDUSTRIAL DIVISION

Dept. CA-12, 110 No. Wacker Drive, Chicago 6, Illinois

Inspection by Jack Brunner can net 28% saving on mine power feeder costs

When Jack Brunner looks over your power supply system, it can mean substantial savings on mine power feeder costs . . .

. . . as much as 28% on some jobs! Jack, a Rome Cable salesman in Pittsburgh, does it with Rome MPT—which he can recommend under certain conditions. Two important requirements Jack looks for before making such a recommendation: relatively steady loads; standard protection against overloading.

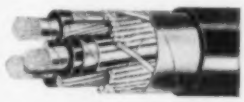
Initial cost is lower than for ordinary mine power feeder cables—as much as 28% in the case of 2 AWG 3-conductor rubber- and neoprene-jacketed 5 kv cable. Compared to these, Rome MPT is smaller in diameter and weighs less, too—easier to handle and install.

Rome MPT lasts longer, too, because the Rolene (polyethylene) insulation and special Roseal (flame-retardant polyethylene) jacket combine to give you outstanding resistance to chemicals, moisture, and abrasion.

Ground fault protection is assured by individual copper shielding of power conductors. And bare ground wire—in direct contact with the shielding—provides a low-resistance circuit in the event of ground faulting of equipment.

See your Rome salesman for more information on Rome MPT—or mail the coupon below.

Rome MPT can be used in boreholes, shafts, trays, aerially or underground. Sizes range from 6 AWG to 250,000 CM. A three-conductor cable, it's rated up to 5,000 volts.



◀ **JACK BRUNNER** has been working out of Rome's Pittsburgh office since April, 1958. Prior to coming with Rome, in 1957, Jack served for two years as an electronics instructor at Aberdeen Proving Grounds for the U.S. Army. A degree from Cornell University in mechanical engineering—followed by Rome's extensive training program—qualifies him to intelligently tackle any mine wiring problem you might have. Just call him!

MEET THE MAN

WHO'S DEDICATED TO YOUR JOB

YOUR ROME CABLE SALESMAN

ROME CABLE Department 1512
Rome, New York

☐ Please send me more information on the above.

☐ I want to "Meet The Man" who can tell me more.

Name.....

Title.....

Company.....

Street.....

City..... Zone..... State.....

News Roundup

FPC Approves Gas Imports

This action is expected to lead to a precedent-setting decision in favor of Canadian gas exports.

THE ONLY GO AHEAD needed now before Canadian gas can be piped into the Midwest is a "yes" from two Canadian agencies, the Alberta Oil & Gas Conservation Board and the National Energy Board.

The Federal Power Commission has removed the last United States barrier to importation by approving Midwestern Gas Transmission Co.'s request to import Canadian gas and licensing the firm to build a $52-million pipeline project to bring the gas into North Dakota, Minnesota, Michigan and Wisconsin.

Authorities close enough to the situation to gage Canadian feeling on the subject say pressure is building up from small profit-starved Canadian oil and gas companies in favor of a precedent-setting approval of exports.

The Plan—If approval comes, Midwestern will build a 504-mi pipeline to pick up the gas from Trans-Canada Pipelines, Ltd., at Emerson, Manitoba, and sell most of it to Michigan-Wisconsin Pipe Line Co. at Marshfield, Wis. The FPC also okayed a $24.2 million pipeline project proposed by Michigan-Wisconsin to transport the gas it buys from Midwestern.

Long Wait—The commission's action winds up long-pending proposals by Midwestern, a subsidiary of Tennessee Gas Transmission Co., to bring Canadian gas into the United States. A year ago the FPC denied applications by Midwestern and other companies to provide the service, but issued specific suggestions for new projects.

Later, Midwestern split a previous $110 million proposal into two parts—one serving the Chicago area with domestic gas and the other to supply north central states with Canadian gas. The FPC approved Midwestern's domestic program last May.

Volume—The company plans to import 204 million cu ft of gas daily from Trans-Canada and resell 158 million cu ft to Michigan-Wisconsin. The FPC, in its decision, concluded that Midwestern's Canadian supply of gas is "reasonably adequate" to support the proposed project. Coal representatives had argued that the gas companies could not guarantee a continuous long-term supply.

James W. Kerr, president of Trans-Canada, said if the export license is approved, the company will build a 50-mi lateral of 30-in pipe from its main line near Winnipeg, to Emerson, on the international border. The line, with several compressor stations to help move the gas, would cost $32 million, the firm reported. Construction would begin next spring.

New Labor Law Raises Doubts

A joint committee, created to enforce an agreement between the United Mine Workers of America and a major portion of the coal industry not to handle coal from producers paying substandard wages, has temporarily suspended activities.

The committee, composed of three union chiefs, including John L. Lewis, and three industry representatives, will await clarification of whether the agreement, known as the protective-wage clause, conflicts with the new Landrum-Griffin labor law's provisions.

Robert Mollohan, executive director of the joint committee, has been told, however, to preserve committee procedures so that they will be ready for use when and if it is decided the wage clause can be enforced legally.

Contract—Under the latest coal contract negotiated in December, 1958 and effective since April 1, 1959, the signatory mine operators agreed to refuse to handle, buy or sell or have anything to do with coal produced at mines paying below union standards.

The protective wage clause was viewed by many as a device designed to cut off outlets and markets of non-union mines and force such producers out of business or into union contracts. It has been bitterly contested by small mine owners in Harlan and Hazard counties in eastern Kentucky who claimed they could not afford to remain in business if they had to pay the same contract wage of $24.25 as the larger companies.

Court Test—Recently, in Kelly v. UMW, one, Kelly, named the United Mine Workers as a defendant, charging the protective wage clause gave way to conspiracy, thereby causing him damages. This case has raised the question of whether the Mine Workers are liable for damages under the Sherman-Clayton anti-trust act, which absolves unions from liability except in cases of collusion.

In This Section

People in Coal ..... p 30
Preparation Facilities ..... p 34
Equipment Approvals ..... p 34
Current Coal Patents ..... p 40
Coal Abroad ..... p 46
Mine and Companies ..... p 52
Utilization ..... p 52
Coming Meetings ..... p 58

Atomic Power

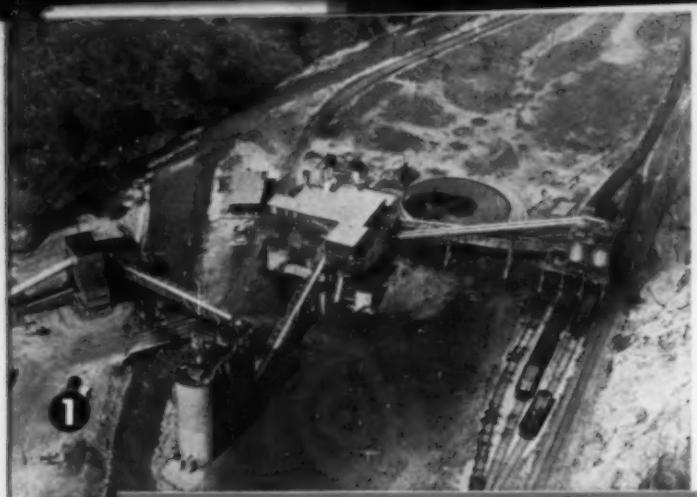
The long-sought atomic power plant that can produce electricity at costs competitive with conventional power plants may be only a $20 million investment away, according to some sources.

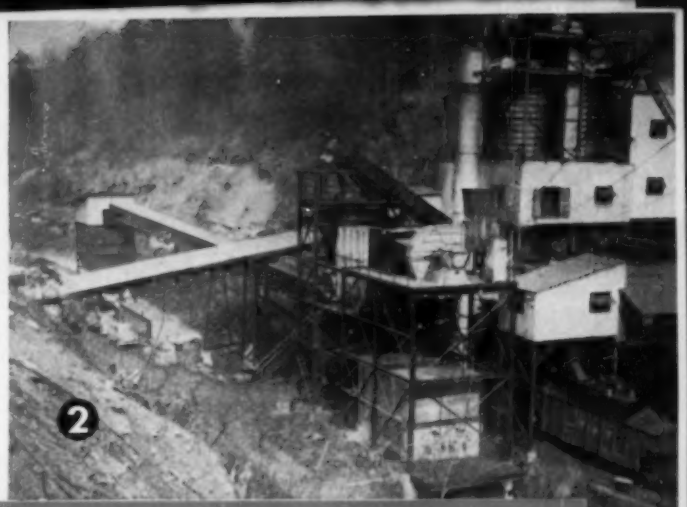
An Atomic Energy Commission official said an important AEC study shows it would take only $20 million in research and development of the pressurized water reactor for the system to become competitive with conventional power systems in high fuel-cost sections of the country.

The system involves heating water under pressure with an atomic reactor. The water is converted to steam by removing the pressure and the steam is used to run a conventional generating turbine. Although a pressurized water reactor in a plant producing 300,000 kw of power would produce the power at an estimated cost of 9.28 mills per killowatt, an additional $20 million investment could cut this cost to a more competitive 7.81 mills, says Frank K. Pittman, director of the AEC's Reactor Development Div.

Westinghouse Electric Corp. currently is trying to sell the utility industry a 330,000-kw pressurized water plant which the company claims could produce power at a cost as low as 7.3 mills per kilowatt-hour. Westinghouse estimates the cost of its plant at $64 million with research and development costs of only $4,400,000.

(*Continued on p 28*)





Coal Preparation Plants built in '59

. . . BY HEYL & PATTERSON

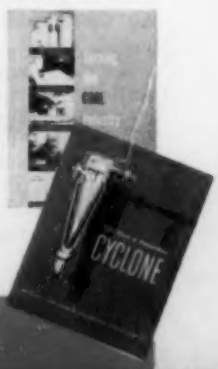
H&P

1. Westmoreland Coal Co., Hampton No. 4 Preparation and Thermal Drying Plant . . . 440 TPH of 5" x 0 coal.
2. Jewell Ridge Coal Corp., Jewell Valley Preparation and Thermal Drying Plant . . . 160 TPH of ¼" x 0 coal.
3. Rochester & Pittsburgh Coal Co., O'Donnell Mine No. 2 Preparation and Thermal Drying Plant . . . 400 TPH of 5" x 0 coal.
4. Massey Coal Mining Co., Ben Creek No. 2 Preparation Plant . . . 120 TPH of ¼" x 0 coal.

. . . and now No. 5 just completed!

Rochester & Pittsburgh Coal Co., Ernest Mine Preparation and Thermal Drying Plant.

Write for Brochures
describing complete Preparation Plants or Processing and Thermal Drying equipment.



HEYL & PATTERSON, inc.

55 FORT PITT BLVD., PITTSBURGH 22, PA.

WHEN EXPERIENCE COUNTS . . . COUNT ON HEYL & PATTERSON!

Battling Costs

Three different types of companies, Tampa Electric Co., Peabody Coal Co. and Virginia-Carolina Chemical Co., have joined together to attack one common problem—cost.

The companies have formed two shipping firms, Gulf Transit Co. and Mid-South Towing Co., for the purpose of transporting coal for the utility's Gannon steam station and phosphate products from Tampa to principal ports on the Gulf Coast, and to Ohio, Illinois and Mississippi river systems.

The shipping firms will have a reconverted tanker with an annual coal-hauling capacity of 100,000 tons, plus 64 all-steel barges. When the vessels are not being used for transportation of Virginia-Carolina's phosphate or a return load of Peabody's coal to Tampa Electric's Gannon plant, they will be used to haul sulphur and other bulk commodities. Considerable savings all the way around are expected to result from the three-way plan.

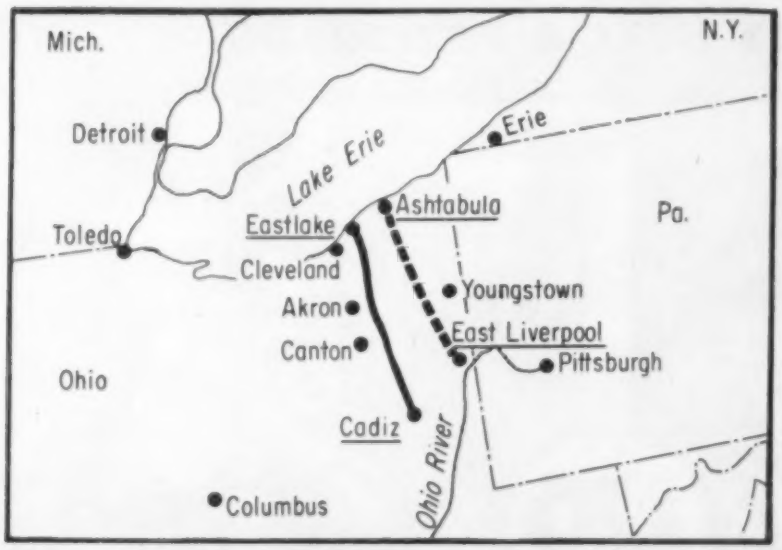
Gas For Con-Ed

A Federal Power Commission order preventing Transcontinental Pipe Line Corp. from delivering gas owned by Con-Edison of New York to a Con-Ed station for use as boiler fuel has been reversed by a United States Court of Appeals.

The Court ruled that because the main consideration by the commission, end-use of the gas, was not within the scope of commission authority, it had exceeded its statutory power in denying Transcontinental the certificate applied for.

The Court went on to say that neither the original Natural Gas Act of 1938 nor the 1942 amendment gave the commission power to resolve conservation problems, noting that the FPC itself recognized the deficiency in the Gas Act in its annual reports to Congress in which it sought legislation specifically delineating the commission's control over matters of conservation.

Authorities note that the decisions could have serious implications for the coal and related industries because conservation has been the primary argument in certificate proceedings before the FPC. It is not known yet whether there will be an appeal.



BROKEN LINE indicates approximate route second coal pipeline would take.

Coal Pipeline No. 2 Considered

Discussions with utilities concerning construction of a second coal pipeline in northeastern Ohio are underway, reports the newly-formed Youngstown Coal Pipelines Co. It would run from the East Liverpool area to Ashtabula, Ohio (see map).

The 90-mi pipeline would be used to transport coal to dockside at Lake Erie, from which, coal would be shipped by barge to utilities and other customers in the Great Lakes area. The first coal pipeline, completed last year, transports coal from a Consolidation Coal Co. mine at Cadiz, Ohio, directly to Cleveland Electric Illuminating Co.'s Eastlake power plant.

The new pipelines firm's plan calls for coal to be barged along the Ohio River to the line's southern terminus, delivered in a 12- or 14-in line to a point "near the Pinney Dock & Transport Co. dock," dried, and transshipped to customers along the Lakes.

Estimated cost of the line is about $10 to $15 million. The expense could be substantially less if a railroad, which is said to be considering the plan, decides to join the project and allows the pipeline along its right of way. Capacity of the 14-in line would be about 3 million tons per year.

YCP estimates savings for utilities could be in the order of a dollar a ton. Talks are scheduled with Toledo Edison, Detroit Edison, Consumers Power and Ontario Hydro, reports the firm. R. H. Henry, Youngstown president, adds that "there has been some interest on the part of some steel mills in the Youngstown area in bringing metallurgical-grade coking coal in from Ohio River barges."

New Power Source

Ten electric utilities and the Everett Research Laboratory of Avco Corp. have joined in a project that they say could some day revolutionize electric power generation.

The system produces electricity by passing a superheated gas through a magnetic field. The gas replaces the solid coil of wire, or armature, in a standard generator. It is based on a scientific principle known as magnetohydrodynamics.

Philip Sporn, president of American Electric Power Co., which will represent the ten utilities in the project, described the system as "one of the most exciting possibilities in the history of the electric power industry."

He said that $350,000 would be spent over the next 8 to 10 mo to investigate the system's possibilities. Estimates of when the new method might become practicable and competitive with conventional power generation ranged from 10 to 30 yr.

Planning Expansion

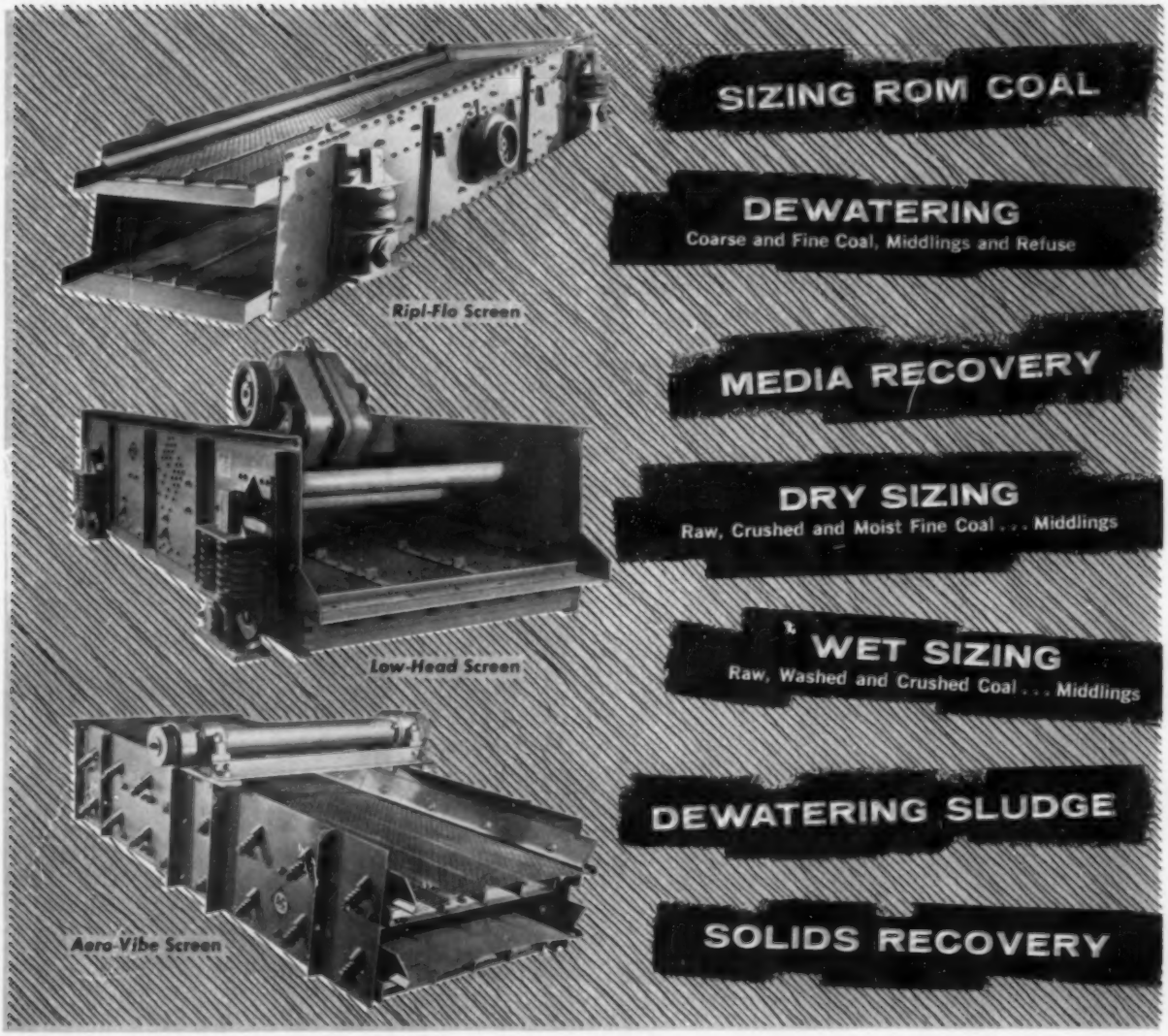
The Stonega Coke & Coal Co. and the Virginia Coal & Iron Co. are planning to speed up expansion of their operations in Wise County, Va.

These intentions were revealed recently by E. B. Leisenring Jr., president of Stonega and executive vice president of Virginia Coal, and R. H. Knode, Virginia Coal president and chairman of the board at Stonega. Plans for development,

(*Continued on p 48*)

...ON HEIL & PATTERSON!

Choose from Allis-Chalmers complete line of vibrating screens for:



Whatever your need . . . Allis-Chalmers can provide the exact vibrating screen your coal process requires!

For applications in ROM screening, sizing, dewatering, and media recovery, Allis-Chalmers has a complete line of standard units up to 8 by 20 feet . . . screens which have been use-tested and proved at coal preparation plants in all areas of the world. The quality of A-C screens, the satisfaction of users account for the fact that *more A-C screens are used by the coal industry* than screens of any other manufacturer.

A helpful screen selection guide has been prepared to help you choose the right model for your process. Contact your Allis-Chalmers representative or write for Bulletin 25B6280. Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.

Aero-Vibe, Low-Head and Ripl-Flo are Allis-Chalmers trademarks.

ALLIS-CHALMERS

A-1201

People in Coal

Sixty Years in Coal

WILLIAM L. AFFELDER, recently elected president of Emerald Coal & Coke Co. and its subsidiary, Emerald Land Co., has been active in the coal industry for 60 yr. In fact, that many years ago, he wrote several technical articles for *Mines and Minerals*, the predecessor of *Coal Age*.

Emerald Coal owns and operates a large Pennsylvania bituminous coal mine and with its Land Co. owns extensive metallurgical coal acreage in Greene County, Pa. In addition to his affiliations with Emerald, Mr. Affelder is president of Henderson Coal Co. and Wis-Don Coal Land Co., as well as vice president of J. H. Hillman & Sons Co., Hillman Transportation Co. and Hillman Barge & Construction Co.

Born May 16, 1879, Mr. Affelder graduated from Pennsylvania State College (now Pennsylvania State University), and spent 47 yr of his career with the Hillman interests in various executive capacities. Prior to that, his principal positions were superintendent of the Pittsburgh Plate Glass Co.'s Mosgrove Coal Works, superintendent of the H. C. Frick Coke Co.'s Redstone plant and general manager of Bulger Block Coal Co.

Mr. Affelder is a director of Pittsburgh Coke & Chemical Co. and is a past vice president of both the Engineers' Society of Western Pennsylvania and the Coal Mining Institute of America.

United Electrical Coal Cos. Elects New Officers

John M. Morris has been elected president and **Frank F. Kolbe** chairman of the board of the United Electric Coal Cos. Other officers elected were: **R. J. Hepburn**, vice president – operations; **T. J. Tarzy**, vice president–sales; **L. C. Sherrill**, vice president–St. Louis offices; **G. H. Utterback**, secretary-treasurer; **J. T. Murray**, controller; **A. M. Foehrer**, assistant secretary; and **D. A. Ford**, assistant treasurer.

Mr. Morris

Mr. Kolbe

George E. Owen, president, Imperial Coal Corp., has been re-elected president of The Central Pennsylvania Coal Producers' Association and the Eastern Bituminous Coal Association. Other officers elected were: **R. T. Todhunter Jr.**, and **R. H. Seese**, vice presidents; **R. T. Laing**, secretary-treasurer and executive director; **C. P. O'Neill**, assistant treasurer; and **F. G. Smith**, counsel. Directors of the Central Pennsylvania group are: **T. L. Aitkan, Otes Bennett, H. S. Clark, A. H. Collins, A. B. Crichton Jr., C. A. Dobson, J. E. Emerick Jr., H. J. Harper, D. E. Hartman, D. J. Kennan, J. W. Krous, J. K. McCarthy, T. F. McCarthy, W. J. B. Mayo, R. E. Moore, H. K. Powell, W. H. Ritter**, and **J. E. Smith.**

Named to the board of the Eastern Bituminous Association were: **C. G. Berwind, H. S. Clark, C. F. Clement Jr., M. A. Crawford, M. A. Evans, S. Light, J. W. McGinn, J. B. Mull, R. S. Walker, R. W. Wigton**, and **H. D. Woolridge.**

Herbert E. Steinmann Jr., has been appointed chief mining engineer at the Vesta-Shannopin Coal Div. of Jones & Laughlin Steel Corp., replacing the late N. A. Borzella. A graduate in mechanical engineering from Pennsylvania State Extension College, he also attended West Virginia University, and completed courses in coal preparation. With Vesta-Shannopin Div. since 1950, he has also been employed by the Pennsylvania State Highway Dept., DuPont Co., Hayden Chemical Corp. and F. H. McGraw & Co.

Raymond E. Salvati, president of Island Creek Coal Co. and head of The American Mining Congress, has been named by the American Institute of Mining, Metallurgical and Petroleum Engineers, to receive its Erskine Ramsay Gold Medal. A native of Huntington, W. Va., Mr. Salvati has been cited for numerous awards in the past for his contributions to industry and civic affairs, and was one of the eight industrial leaders in the United States to receive the Horatio Alger award for 1958. His citation from the AIME reads: "For his

Mr. Salvati

outstanding contributions and achievements in the development and application of modern technology in underground coal mining and in the preparation of bituminous coal, and for his many years of distinguished leadership within the industry."

John J. Kodak, formerly general mine foreman at Helen No. 9 mine of Eastern Gas & Fuel Associates, has been transferred to Federal No. 1, Grant Town, W. Va., as general mine foreman. **Robert E. Short,** who was general mine foreman at Eccles, has been transferred to Stotesbury No. 10, Helen, W. Va., in the same capacity.

Obituaries

John C. Haddock Jr., 66, prominent Pennsylvania anthracite operator, passed away Nov. 10. Mr. Haddock was president of the Morris Run Coal Mining Co. and had formerly headed the Haddock Mining Co., Silver Brook Anthracite Co. and Alden Coal Co. He was a graduate of Yale University and served in the Navy during World War I.

David F. Brittle, 59, editor of the weekly Industry Bulletin of the National Coal Association and advertising manager of NCA, died Oct. 31. Mr. Brittle was born in Pittsburgh and reared in Los Angeles. He began his newspaper career in 1919 and had been with NCA since 1949.

H. S. Homan, executive secretary of Southern Appalachian Coal Operators Association, died Nov. 15. Mr. Homan, who once operated mines for himself, came to the Southern Appalachian group from the Big Sandy Operators Association.

Guy M. Yeager, chief engineer at the Tralee mine of the Semet-Solvay Div., Allied Chemical Corp., in West Virginia, died Nov. 9. He was a director of the Appalachian chapter of the West Virginia Society of Professional Engineers.

GIANT for its size

Giant for work, speed-king for set-up and reading, ingenious for ease of operation...and as tough as they come for rugged field conditions.

In surprising and welcome contrast to full size performance is its neat, compact size: just 4½ x 6" overall.

With tilting screw and prismatic tubular level, at a price much lower than you would expect, the Wild N-10 deserves your consideration.

Write for Booklet N-10

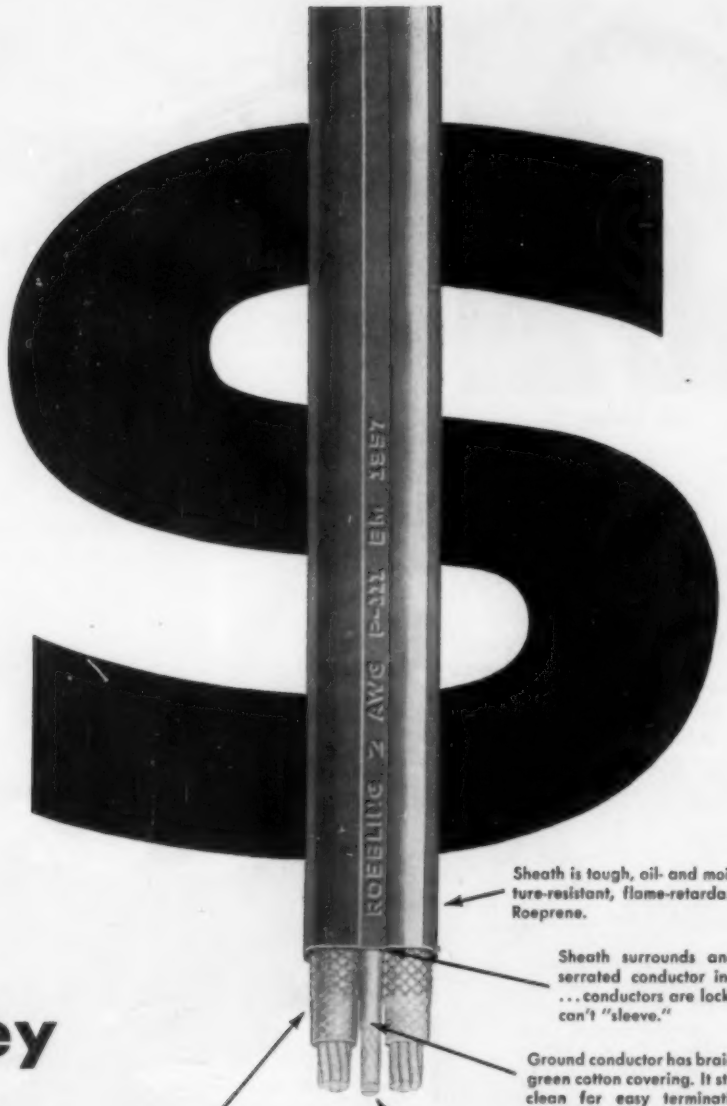
N-10 SURVEYOR'S LEVEL

Full Factory Services

WILD HEERBRUGG INSTRUMENTS, INC.

MAIN AT COVERT STREET,
PORT WASHINGTON • NEW YORK
PORT WASHINGTON 7-4843

For the **extra life** that's **money in your pocket...**


ROEBLING 2 AWG (7-111) BM 1957
Sheath is tough, oil- and moisture-resistant, flame-retardant Roeprene.
Sheath surrounds and grips serrated conductor insulation ... conductors are locked fast, can't "sleeve."
Ground conductor has braided green cotton covering. It strips clean for easy terminating, splicing.
GR-S insulation around each power conductor is heat- and moisture-resistant.
Ground conductor is braided and eased into shape from fine annealed copper wire for outstanding resistance to flexing fatigue and tensile stress.

ROEBLING PARALLEL TWIN CABLE!

This economical, extra-flexible cable is available as Type G, with ground wire, or Type W, without. Complies with the flame resistance test of the State of Pennsylvania, Department of Mines, and the requirements of the U. S. Bureau of Mines, and carries the marking P-111BM.

A combination of quality features makes Roeprene® Parallel Twin Mining Machine Cable different and better. Some of these features may seem like small details ... but, taken together, they figure *big* in terms of easier installation and maintenance, and valuable *extra* service life. Flexible Roeprene Parallel Twin Cable is built to take tough treatment!

For more details about these cables, and the savings they mean, write Electrical Wire Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation

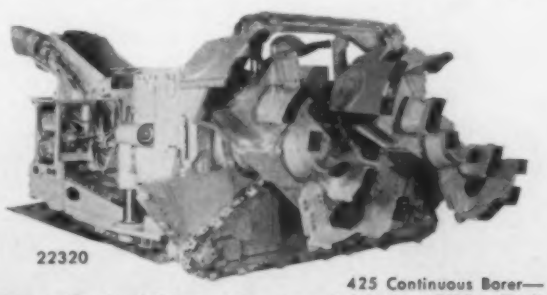
22499 Patented and patents pending

How to turn solid coal into profitable tonnage

A Goodman 425 Continuous Borer operating in a West Virginia mine over a 2 month period of 37 day shifts with a 5 man crew, mined 25,129 tons of coal and advanced 8,976 feet. Tons per shift averaged 679.2 with a peak of 1136. Tons per man per shift averaged 135.8. Average advance per shift was 242.5 feet, and tons per foot of advance averaged 2.8 . . . *all in solid work.*

Seam height of 6′4″ had variations which were easily compensated for because the Goodman 425 features an adjustable height (at the face without delay or the addition of parts). Mined coal was loaded from the bottom by one loader serviced by two shuttle cars.

Here then, is another typical example of the high tonnage capacity built into every Goodman Continuous Borer, a profitable capacity that keeps men and machines at the working face, producing more coal with less supervision. Prove it to yourself by an actual demonstration. We'll be happy to make arrangements.



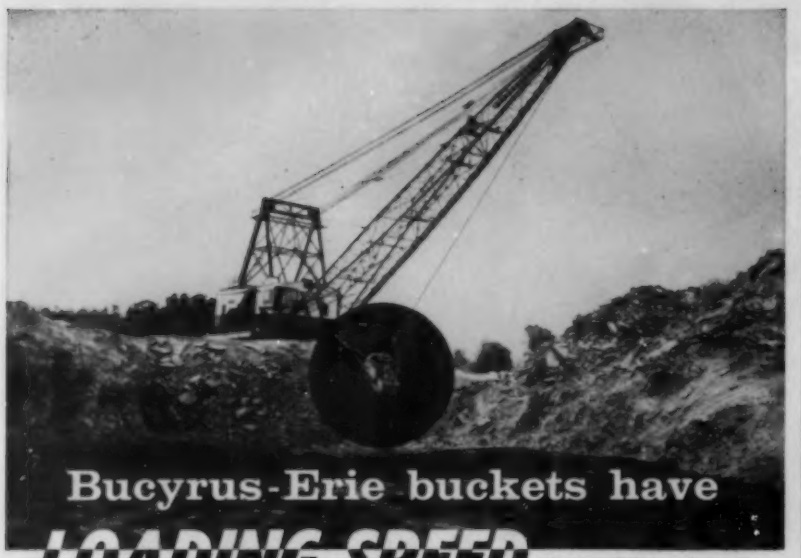
22320

425 Continuous Borer—
One machine for full-face mining at any height from 5½′ to 7½′. Height can be varied as the machine works.

GOODMAN
MANUFACTURING COMPANY
Halsted Street and 48th Place, Chicago 9, Illinois

CUTTING MACHINES • CONVEYORS • LOADERS
SHUTTLE CARS • LOCOMOTIVES • CONTINUOUS MINERS

Use Genuine Goodman Replacement Parts



Bucyrus-Erie buckets have

LOADING SPEED built in!

In high-speed Bucyrus-Erie buckets, weight is concentrated to help teeth, cutting edge, and thin "slicing action" lip penetrate swiftly. Material flows in easily because the bucket is tapered properly.

Bucyrus-Erie buckets swing smoothly through the carry without bobbing and spilling because they're properly flared and balanced. The high arch and smooth inside design assure clean, fast dumping.

For better bucket production, see your Bucyrus-Erie distributor or representative, or write Bucyrus-Erie Company, South Milwaukee, Wis., Dept. 4RA.

BUCYRUS ERIE®

BUILDS BETTER EQUIPMENT

Preparation Facilities

Eastern Gas & Fuel Associates, Wharton No. 2 mine, Barrett, W. Va.—Contract closed with Kanawha Mfg. Co. for froth flotation circuit consisting of 12 Wemco Fagergren 66-in flotation machines to handle 2,200 gpm of slurry containing about 40 tph of solids. Feed is combination of 24-in cyclone underflow and desliming screen effluent. Concentrate goes to present vacuum filter and tailings to present static thickener.

Feds Creek Coal Co., Biggs, Ky.—Contract closed with Kanawha Mfg. Co. for insertion of hand-picking facilities between two existing mine-run retarding conveyors which permit large rock to be scalped off and disposed of on the mountain. Consists of Lecco 6x6-ft horizontal picking screen and remodeling of existing rock conveyor delivering to bin.

Scott Bros. Coal Co., Glasgow, Pa.—Contract closed with The Irvin-McKelvy Co. for balanced screening conveyor with mechanical slate ejector, crusher, conveyors and storage bins to handle 100 tph of nut, nut slack and 3-in lump.

Kingwood Mining Co., Kingwood, West, Va.—Contract closed with The Irvin-McKelvy Co. for two balanced screening conveyors with mechanical slate ejectors, crusher, conveyors and storage bins to handle 150 tph. Completion scheduled for December, 1959.

Guardian Coal Co., Clarksburg, W. Va.—Contract closed with Industrial Engineering & Construction Co., Inc., for three-cell feldspar jig to clean ½x0 coal.

Equipment Approvals

Joy Mfg. Co.—Type 6CM-1AE continuous mining machine; eight motors, two 100 hp, two 25 hp, three 10 hp and one 15 hp, 250 V, DC. Approval No. 2F-1504, Oct. 7.

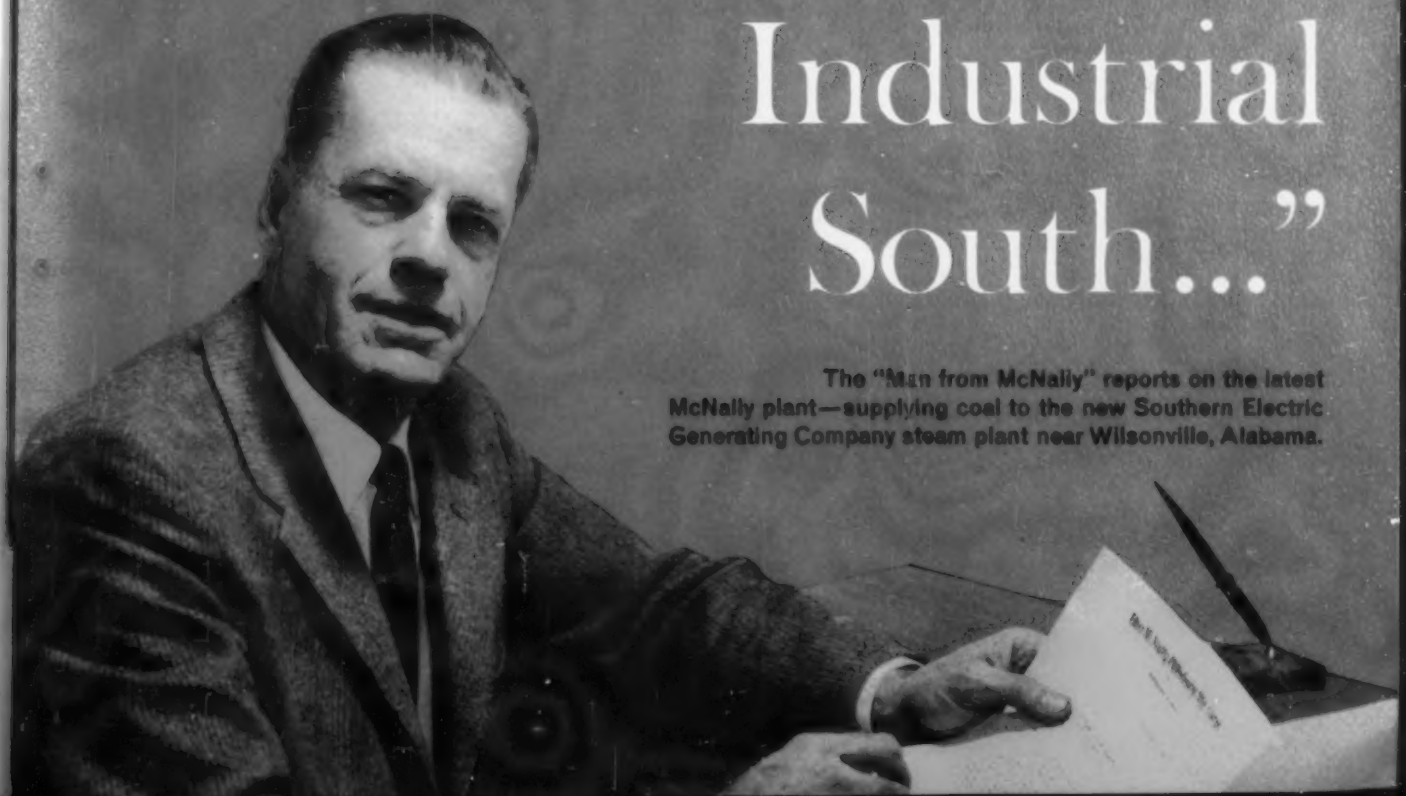
The Long Co.—Model 26 continuous miner; three motors, each 40 hp, 440 V, AC. Approval No. 2F-1505A, Oct. 12.

Goodman Mfg. Co.—Type 427 continuous borer; two motors, one 250 hp, and one 50 hp, 440 V, AC. Approval No. 2F-1506A, Oct. 14.

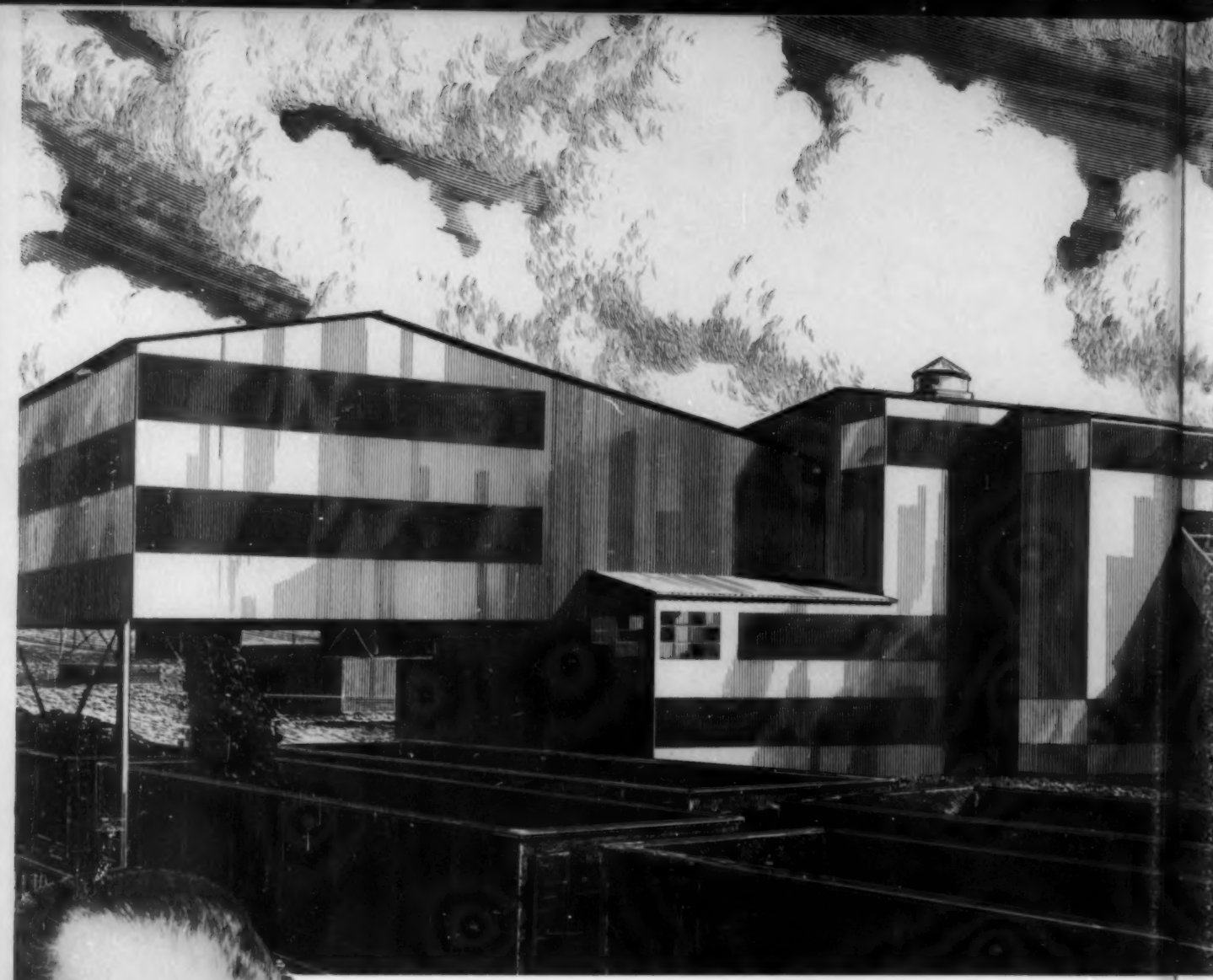
Galis Electric & Machine Co.—Model 320A rotary roof drilling machine; one motor, 25 hp, 440 V, AC. Approval No. 2F-1507A, Oct. 19.

Megator Pumps & Compressors, Inc.—Model K-3 mine pump; one motor, 7½ hp, 440 V, AC. Approval No. 2F-1508A, Oct. 29.

"New McNally plant helps power an expanding Industrial South..."



The "Man from McNally" reports on the latest McNally plant—supplying coal to the new Southern Electric Generating Company steam plant near Wilsonville, Alabama.



Get to know the "Man from McNally"— a competent, trained engineer, who can put 37 years of experience into the design, engineering, and fabrication of high efficiency coal preparation equipment to work for you.

Southern Electric Generating Company's new Mine No. 1— one of the largest, most modern in the South—will utilize

"...new high speed, maximum efficiency McNally Coal Preparation Plant"

Going into full operation in 1961, this new Southern Electric Generating Company (SEGCO) Mine will produce 1,500,000 tons of prepared coal annually and supply the major portion of coal required by Southern Electric Generating Company's new 1,000,000 kw steam generating plant near Wilsonville, Alabama.

The coal preparation plant, designed and engineered by McNally, will receive raw 4" x 0 coal at 750 tph for washing in one McNally Giant Automatic Coal Washing Jig.

Washed coal over ¼" is dewatered on two screens with the through product delivered to the settling tank for 48 mesh classification. The ¼" minus coal is recovered from the settling tank and de-slimed on two vibrating screens. A 90-foot thickener receives 40 tph of 48 mesh x 0 coal in water. Surface water is pumped through the clarified water sump, and the underflow goes to the ¼" x 0 de-sliming screens.

Washed coal is delivered to two railroad tracks for continuous loading on either track. The 40-car haul loads 40 cars on one track while pulling the next 40 cars for the next loading cycle.

New McNally preparation plant at SEGCO Mine No. 1, near Parrish, Alabama.

ASK THE MEN WHO KNOW COAL FROM THE GROUND UP

McNALLY PITTSBURG

MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburg Manufacturing Corporation

Manufacturing Plants:
Pittsburg, Kansas • Wellston, Ohio

Engineering and Sales Offices:
Chicago • Rio de Janeiro
Pittsburg, Kansas • Wellston, Ohio

MAIL THE POSTCARD TODAY

Find out for yourself just how much you can improve your plant efficiency and profits with McNally Pittsburg coal preparation equipment.

Gentlemen:

Please send me information about the following equipment:

- ☐ Complete Coal Preparation Plants
- ☐ Washers ☐ Coal Cleaning
- ☐ Thermal Dryers ☐ Centrifugal Dryers
- ☐ Crushers ☐ Conveyors

NAME_____ TITLE_____

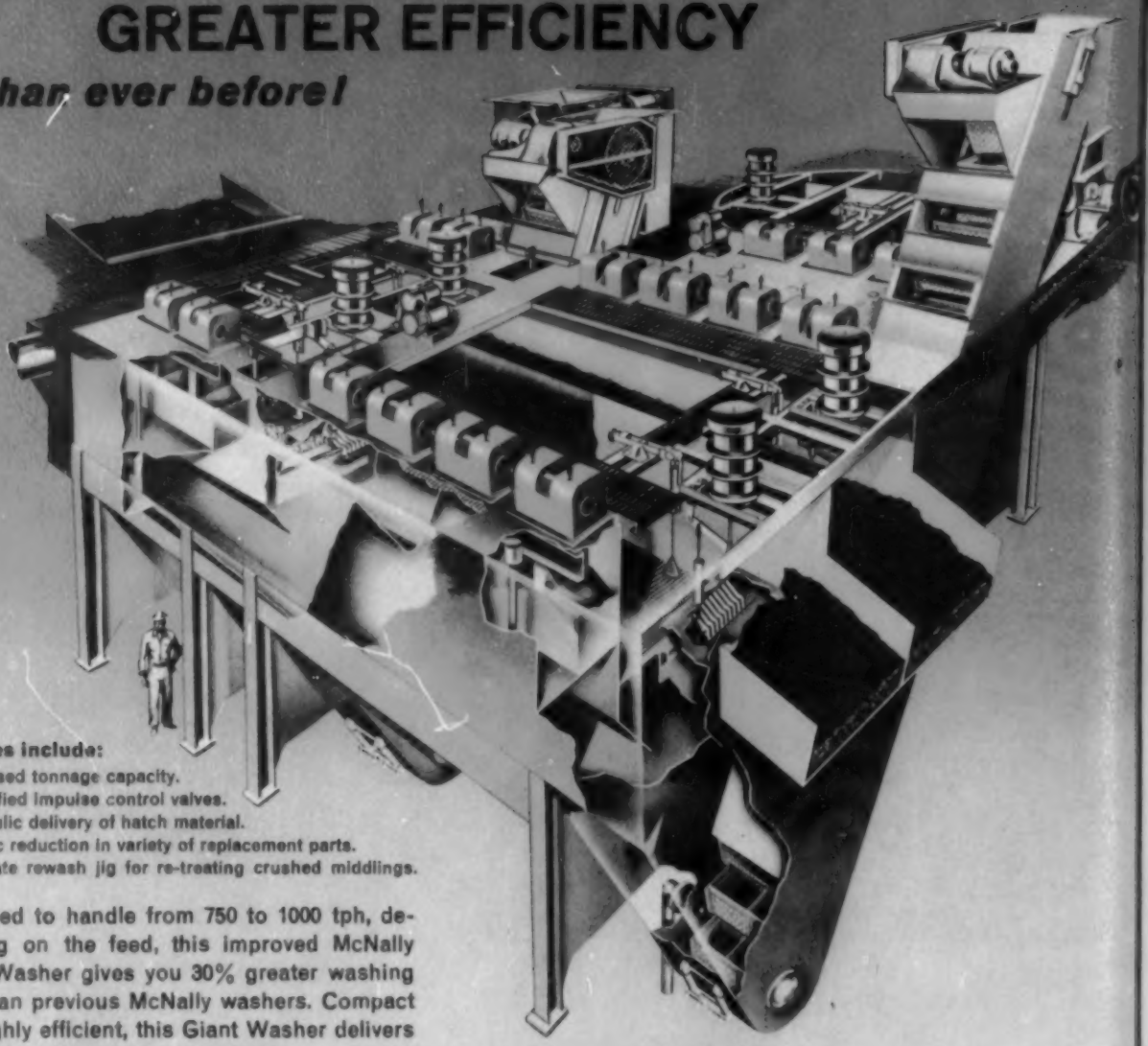
COMPANY_____

CITY_____ STATE_____

C

GREATER TONNAGE GREATER EFFICIENCY

—than ever before!



Features include:

- Increased tonnage capacity.
- Simplified impulse control valves.
- Hydraulic delivery of hatch material.
- Drastic reduction in variety of replacement parts.
- Separate rewash jig for re-treating crushed middlings.

Designed to handle from 750 to 1000 tph, depending on the feed, this improved McNally Giant Washer gives you 30% greater washing area than previous McNally washers. Compact and highly efficient, this Giant Washer delivers proved savings in horsepower per ton . . . simplified maintenance and flexibility of adjustment.

These are just a few of the advantages of this Giant Washer—write for Bulletin No. 857.

McNALLY GIANT WASHER

FIRST CLASS PERMIT No. 93 (Sec. 34.8, P.L.&R.) PITTSBURG, KANS.

BUSINESS REPLY CARD

NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

5¢ POSTAGE WILL BE PAID BY—

McNally Pittsburg Mfg. Corp.

PITTSBURG, KANSAS

Write for full details on this or any other McNally Pittsburg coal preparation equipment

McNALLY PITTSBURG

MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburg Manufacturing Corporation
Manufacturing Plants: Pittsburg, Kansas • Wellston, Ohio
Engineering and Sales Offices: Chicago • Rio de Janeiro
Pittsburg, Kansas • Wellston, Ohio

Printed in U.S.A.

Geoprene* Y-ground Portable Mining Machine Cable.

Super Coronol* Geoprene Type SH-D Ground Check Cable.

Super Coronol Geoprene Minepower Ground Check Cable.

General Electric offers a complete line of dependable cables

FOR A-C UNDERGROUND MINING

Here are three a-c underground mining cables from the complete G-E line which illustrate the hard-wearing, long-lasting qualities of *all* G-E mining cable:

Geoprene Y-ground Portable Mining Machine Cable. This cable, specifically designed for use on a-c shuttle cars, loaders, cutting machines, and the like, offers the utmost in flexibility and long life. The Y-shaped ground conductor separates three insulated-phase conductors, reducing the possibility of phase-to-phase faults in the event of cable damage. The Y-ground also has sufficient conductivity to trip the machine breaker, and simplifies the job of splicing.

Super Coronol Geoprene Type SH-D Ground Check Cable. The flexibility and sturdiness of this cable permit moving the load center forward without disconnecting the high-voltage power feeder. This cable, similar to standard Type SH-D, is available with an insulated ground check conductor in voltages up to 15 kv.

Super Coronol Geoprene Minepower Ground Check Cable. The non-metallic construction of G-E minepower cable provides light weight and ease of installation. The Super Coronol insulation on this cable—as on G-E Type SH-D cable—resists ozone, moisture, heat, and aging. The lead-cured neoprene jackets on both cables resist flame, oil, acids, alkalis, and sunlight.

These special-purpose cables meet various installation and application requirements. BOREHOLE CABLE • AERIAL CABLE • FLAMENOL* MINE TELEPHONE CABLE • SHOT-FIRING CORD • CORDX* LEAD-CURED TYPE SO CORD.

For complete information on General Electric cables for the mining industry, just mail the coupon for new, up-to-date bulletin. *Reg. Trade-mark General Electric Company

All General Electric mine cables bear the symbol P-108 of the Pennsylvania Department of Mines, and where required also carry the BM marking indicating listing by the United States Bureau of Mines.

Progress Is Our Most Important Product

GENERAL ELECTRIC

General Electric Company
Wire and Cable Department
Section W233-1214
Bridgeport 2, Conn.

Please send me your new bulletin on General Electric portable and power cables for the mining industry.

Name_____

Title_____

Company_____

Street_____

City_____ Zone_____ State_____

Current Coal Patents

By: Oliver S. North

Extensible conveyors, H. E. Smith (assigned to Goodman Mfg. Co., Chicago, Ill.), Oct. 20, 1959. In extensible belt conveyors, means are provided for the operator to place a support stand for the return reach in position close to the outby end of the tail section. Misalignment of the return reach can be readily corrected by elevation adjacent to the tail section. No. 2,909,273.

Drill steel supporting and storing device, C. G. Boudette (assigned to Joy Mfg. Co., Pittsburgh, Pa.), Oct. 20, 1959. Design for an improved storage and handling device for rock drill steels, particularly useful on drilling machines used in the drilling of upright holes. The rotary rack enables quickly moving drill steel sections into and out of position on the machine, and substantially lessens the amount of manual handling necessary. No. 2,909,288.

Prop and conveyor arrangement for mines, W. Wilkenloh, E. Jäger and F. Kühnapfel (assigned to Rheinstahl Wanheim Gesellschaft mit Beschrankter Haftun, address not listed), Oct. 27, 1959. In a conveyor and prop arrangement for mines, a single advancing means common to the conveyor and the front and rear prop means is provided. The hydraulic conduits are so positioned as to reduce the length of exposed hydraulic conduit to a minimum. The conveyor can be advanced either by steps or continuously, thus permitting flexibility in the operation of the system. No. 2,910,281.

Mine roof support devices, W. H. Barrett (assigned to Dowty Mining Equipment, Ltd., Tewkesbury, England), Oct. 27, 1959. In a mine roof supporting device comprising a base member and two or more props, the skid plate of the support frame where it makes contact with the mine floor is made wider at the front than the rear, whereby the pressure per unit area is less at the front than at the rear. Pitching downwardly of the forward end of the frame is lessened or prevented entirely. No. 2,910,282.

Continuous mining apparatus having core forming means and multiple core dislodging devices, J. F. Joy (assigned to Joy Mfg. Co., Pittsburgh, Pa.), Oct. 27, 1959. Design for a continuous mining machine provided with improved kerf cutting means embodying a circulating loop cutter for cutting out and dislodging a core without necessity of blasting. No. 2,910,283.

Rope clamp for troughing roller assembly, J. S. Newton and C. H. Brown (assigned to Goodman Mfg. Co., Chicago, Ill.), Nov. 3, 1959. An apparatus for mounting a troughing roller assembly to the flexible support strands is characterized by a clamp located out of the way of the conveying reach when the latter becomes misaligned. No. 2,911,090.

Suspension process for the production of CO and H_2 from a solid carbonaceous fuel, oxygen and steam, F. Totzek (assigned to Koppers Co., Inc., Pittsburgh, Pa.), Sept. 22, 1959. Improved method for the gasification of a suspension of finely divided coal, brown coal, lignite, peat, etc., with oxygen and steam or other types of endothermically reactive medium. Oxygen consumption is substantially reduced and an increased quantity of the carbonaceous material is converted also into gas. No. 2,905,544.

Talk about holding power...
"Top-Tite's" GOT IT!
Here's what bolting people have been looking for!
A STEEL SHELL that leads the way in...
HOLDING POWER—TIGHTENING SPEED
—RELIABILITY
"TOP-TITE" has fine grooves instead of saw teeth for better, more even distribution of the bolt load. And the jumbo-sized plug makes sure the broad leaves stay against the hole wall . . . no leaf curl-in. And for speed of tightening—just ask a crew that's switched to "TOP-TITE".
Have you had trouble with plug pull-out . . . leaf breakage . . . misalignment? Instead of merely lessening these problems, "TOP-TITE" eliminates them. Call or write us today!
MANUFACTURED BY
THOMPSON PRODUCTS VALVE DIVISION
Thompson Ramo Wooldridge Inc.
STOCKED AND DISTRIBUTED BY
National Mine Service Company
KOPPERS BUILDING PITTSBURGH 19, PA.
LOGAN, W. VA.
PORTY FORT, PA.
BECKLEY, W. VA.
INDIANA, PA.

CYANAMID

COAL KING

split-second delay caps...

for improved production and greater safety!

Now, you can benefit from the advantages of multiple short-delay blasting. Rapid delay firing possible with new COAL KING* Electric Blasting Caps means more efficient blasting, good loadability and increased production. Greater safety, too, since you can shoot an entire room with the shot-firer's exposure to hazards minimized.

COAL KING Caps afford a choice of 15 different timing periods—varying from 25 to 375 milliseconds. The delay periods are in 25 millisecond increments. These delays are available in a variety of leg wire lengths, and are clearly marked as to delay number.

Like all Cyanamid Electric Blasting Caps, COAL KING iron leg wires are insulated with 4 concentric layers of vinyl plastic to assure dependable performance. And, they're colored white for best visibility.

For additional information on Cyanamid's electric blasting caps, permissibles and other blasting accessories, contact our nearest office today.

*Trademark

AMERICAN CYANAMID COMPANY

EXPLOSIVES AND MINING CHEMICALS DEPARTMENT

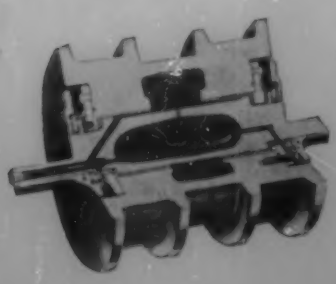
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

SALES OFFICES: Denver, Colorado • Maynard, Massachusetts • Kansas City, Missouri • St. Louis, Missouri • Albuquerque, New Mexico New York, N.Y. • Tulsa, Oklahoma • Latrobe, Pennsylvania • Pottsville, Pennsylvania • Dallas, Texas • Salt Lake City, Utah • Bluefield, West Virginia
PLANTS: Grafton, Illinois • Latrobe, Pennsylvania • New Castle, Pennsylvania • Springville, Utah
PRODUCTS: High Explosives • Permissibles • Seismograph Explosives • Blasting Agents • Blasting Caps • Electric Blasting Caps • Blasting Accessories

TD-25 power-steering plus

team new 230 diesel hp, new traction.....

You "gain ground" on all four steps of the push-loading cycle with the torque-converter TD-25. (1) you slow-down by power-shifting down and using decelerator to get feather-touch contact; (2) power-shift either track up or down to maintain solid pusher contact on curves; (3) get gear-higher kick-outs with on-the-go power-shifting; (4) reposition faster, with higher-than-ordinary reverse!



Dual-protected TD-25 Dura Rollers have precision-fitted, metal-to-metal cartridge-type sealing—to exclude abrasives and retain lubricant. These rollers have pressure relief passages so they can be power-lubricated—without affecting seal life or efficiency. Dura Rollers have king-size lube reservoirs, to make twice-a-year lubing practical!

on-the-go Hi-Lo power-shifting

....to outearn other rigs up to 50%!

You Power-Steer and Power-Shift the new International TD-25, with 2-finger ease! Exclusive, years-proved Planet Power steering gives you full-time "live-track" power and traction to make full-load turns and eliminate "dead-track drag." Hi-Lo on-the-go power shifting instantly matches power to conditions to prevent losing momentum!

Exclusive Efficiency-Range Control

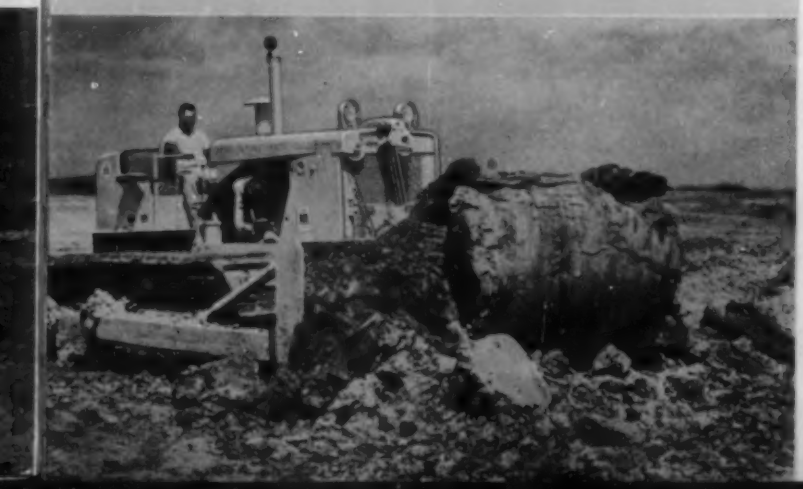
Exclusive International Hi-Lo power shifting makes the TD-25 the industry's only 4-speed torque-converter crawler, and the only one with load-matching, efficiency-range control. In the synchro-mesh transmission TD-25, the Hi-Lo planetary system gives eight speeds forward and reverse—with cycle-speeding up-or-down, on-the-go shifting!

You get big-capacity teamwork of 230 diesel horsepower with the new 7-roller tracks, platformed on super-rugged, double-box-beam frames—and carried on International's new minimum-maintenance Dura Rollers! Over 39 square feet of ground-gripping traction area harness the "25's" great power!

You simply press the direct-start button, to command the "25's" free-breathing diesel horsepower. Dual valving of the "25's" high-torque DT-817 engine provides for peak turbocharging efficiency—to deliver full-rated power from sea level to timberline!

Full performance is at your fingertips, full time. No wonder the TD-25 outearns same-sized clutch-steered crawlers up to 50%—on a wide range of tough jobs!

You don't spill the "pay" part of your load with the TD-25—even when you change speed making the "pass." Hi-Lo on-the-go planetary shifting keeps the blade fully loaded—even when dozing round curves, benching, or side-casting! See how the "25" can help you pocket bigger profits.



SIZE UP TD-25 PLANETARY DRIVE DESIGN that breaks the load-limiting, time-losing steering and shifting bottlenecks—which plague king-sized, clutch-steered crawlers.

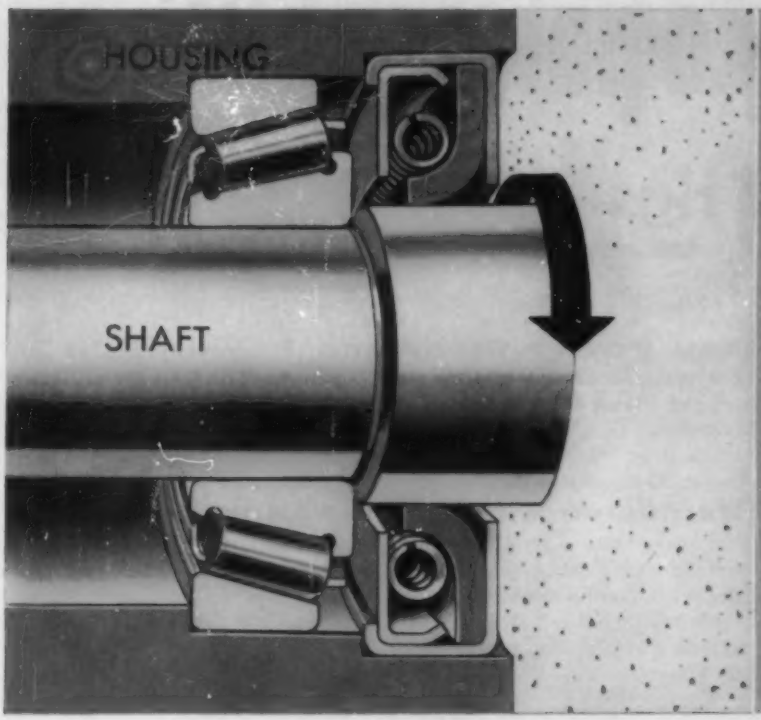
COMPARE NEW TD-25 FULL-LOAD, FULL-TIME ABILITY, to outearn other same-sized rigs—up to 50%! Let your International Construction Equipment Distributor demonstrate!

International® Construction Equipment

International Harvester Co., 180 North Michigan Ave., Chicago 1, Ill.

A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors . . . Self-Propelled Scrapers and Bottom-Dump Wagons . . . Crawler and Rubber-Tired Loaders . . . Off-Highway Haulers . . . Diesel and Carbureted Engines . . . Motor Trucks . . . Farm Tractors and Equipment.

Better products, *faster*, from your Bearing Specialist:



MINIMIZE DOWNTIME on mining machines and equipment with National Oil Seals in leather or synthetics.

In leather or synthetic, National industrial oil seals keep lubricant in, dirt out of your valuable machines!

National Oil Seals feature: 1. *Micro-Torc* leather that seals in oil and grease, has untreated side to absorb lubricant; 2. *Syntech* synthetics "prescription-blended" to meet specific operating conditions.

Micro-Torc and Syntech oil seals come in standard sizes or made-to-order for mining and materials-handling equipment

Count on National Oil Seals to guard your costly machines! They seal *in* the lubricant so vital to precision bearings; seal *out* abrasive dirt and corrosive moisture so harmful to bearings and other machine components—and there's one for *any* job.

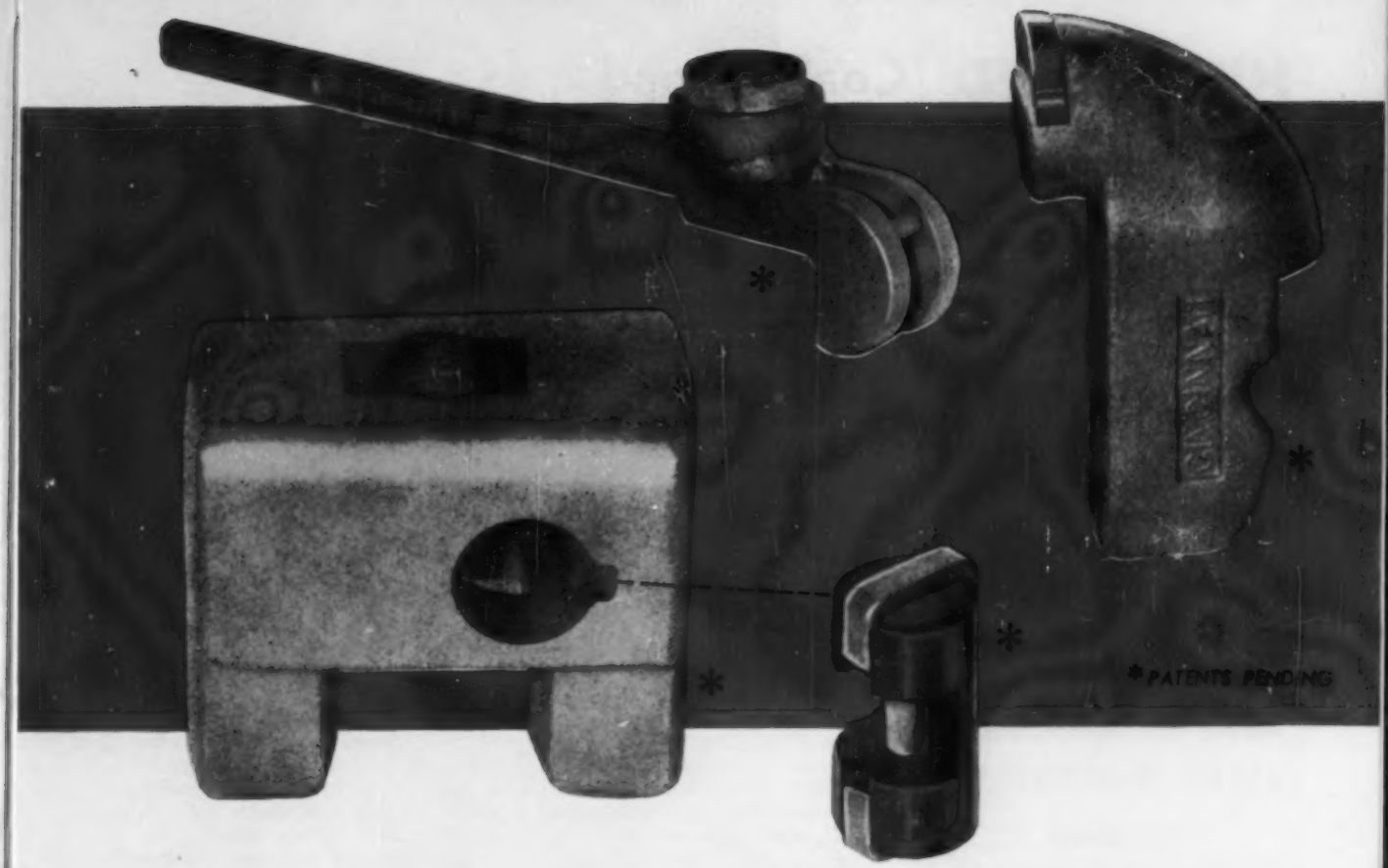
National Micro-Torc leather is impregnated only part-way through. The coated side seals perfectly; the untreated, porous side absorbs the lubricant leather needs to stay flexible, run cooler and longer. **National Syntech synthetics** are "prescription-blended" to meet the most exacting conditions of temperatures, shaft speeds and other critical factors. Both types come in all sizes.

In leather *or* synthetic, National industrial oil seals protect your capital investment at low cost. So why take a chance on a used seal? Call your National Seal specialist for replacements!

NATIONAL OIL SEALS

FEDERAL-MOGUL SERVICE

DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICHIGAN



Again CINCINNATI LEADS THE WAY

The Cincinnati Rap-Lok combination uses an entirely new concept of bit holding means and is the first successful quick-change combination of bit and lug which eliminates set screws entirely. This insures greatly reduced bit setting time, practically eliminates lost bits and points the way to lowered production costs. Bits are set and removed with a special Rap-Lok bit setting tool.

This combination has been time tested and proved in the field and has been enthusiastically received wherever tried.

In addition to individual lugs Cincinnati now manufactures Rap-Lok Ripper Chains, Cutterchains and Trimming Chains for all types of conventional and continuous mining machines.

FOR FURTHER INFORMATION SEE YOUR CINCINNATI REPRESENTATIVE OR WRITE US DIRECT.

THE CINCINNATI MINE MACHINERY CO.

CINCINNATI 25, OHIO

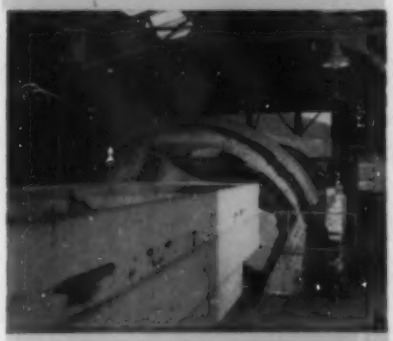
Specialists in cutting equipment for over 35 years

HIGH SPEED DUMPING

through full 360° turn with the

NOLAN

ROTARY CAR DUMPER



Moves coal faster, safer

MORE PROFITABLY!

Features:

- Fully Automatic with Selective Manual Control
- Designed for Today's High Capacity Mine Car
- Gear Driven through Flame Hardened Gears
- Complete with Base Frame, Dump Sheets, and Liner Plates
- Anti-friction Bearings Throughout
- Wide Faced Dump Rings of Special Alloy Steel
- Equipped with Nolan Patented Cushioned Rail Aligning Stop
- Embodies 50 years Experience in Mine Car Dumping and Control

WRITE FOR FREE CATALOG

Illustrating and describing complete NOLAN line of Mine Car Dumping and Control Equipment

NOLAN SALES AGENTS:

George C. Hutchinson, Jr., 800 Keenan Bldg., Pittsburgh, Pa.

Huntington Supply & Equipment Co., 423 First Huntington Nat'l Bank Bldg., Huntington, W. Va.

E. C. Horne Machinery Co., 1726 Champa Street, Denver 2, Colorado

Frank C. Mennett, P.O. 154, Castle Gate, Utah

J. L. Thomas, 429 S. 24th St., Birmingham 5, Ala.

John North Associates, PO. Box 105, Herbert, Mich. (Chicago District)

Levitt Safety Limited, Toronto 10, Canada

THE NOLAN COMPANY

106 Pennsylvania St., Beaverton, Ohio

Coal Abroad

Germans Speed Degasification

Two of Germany's top research and engineering companies have reported a new high-speed degasification process that uses a heat carrier such as coke to which 3 to 10% of its volume in hard coal is added.

Both components are fed continuously into a horizontal mixer and transported through the machine by a screw conveyor. Particle size of the coke and coal must be less than 3 mm. The mixer is heated up to about 400 C and kept at this temperature. The coal is rapidly degasified in some tenth of a second, according to the report, expelling large amounts of tar as by-products.

Gas production is only 70% as compared with the retort process, but the large amount of bitumen and tar can be used for gas production too, say the scientists, if a cracking tower filled with sand or coke is connected with the degasifier. This tower, operated at even higher temperatures, yields almost equal parts of gas and pitch residues.

Oil Pipeline

The European coal industry, already battered by tremendous surpluses and widespread unemployment, has not been cheered by reports that an international oil group is planning a network of oil pipelines to deliver oil to central and south-central Europe.

Reports made to the International Congress of Hydrocarbons indicate that the pipeline would start from Genoa where oil arrives by tanker from Arabia and all Mediterranean sources. A trunk line would connect Genoa with Switzerland by a tunnel under the Alps, with a refinery to be constructed at the Swiss terminal. From there, trunk lines would branch out to other areas.

Overseas Flashes

JAPAN—The coal industry in this country is in the doldrums and emergency measures are being planned to "streamline" the depression-hit industry. Even though production was reduced last year coal inventories as of the end of September of this year reached 12 million tons, a postwar record and nearly twice the normal inventory.

GREAT BRITAIN—The 2,000-ton "Methane Pioneer" tanker, converted last year by Constock Liquid Methane Corp. of America, in a joint experimental venture with the British gas industry, has proved very successful, it is reported. The ship has made five of seven planned voyages since February. The British Gas Council, which has been faced with rising costs and financial losses for the first time in its 10-yr history, has indicated it plans full-scale importation of natural gas from the United States.

WEST GERMANY—The German Parliament's Committee on Economic Affairs approved a measure to extend West Germany's $4.67 a ton duty on coal imports for another year. Earlier this year, when economics minister Ludwig Erhard pushed the tax through parliament, he said it was a temporary measure, but more than 17 million tons of unused coal have piled up at West German mines, requiring continuation of the tariff.

FRANCE—Engineers have completed the first pipeline out of the Sahara and oil is expected to flow at full capacity shortly, bringing new wealth and self-sufficiency to France, the Common Market and Eurafrican economies. The 410-mi, 24-in wide line has been laid in less than a year across the desert from the Hassi-Messaoud field in the Sahara to the Algerian seaport of Bougie on the Mediterranean. In the initial months, say reports, 500,000 tons of crude will spill out of the desert to be loaded onto tankers bound for French refineries. By next spring, about a million tons a month should be delivered.

Bituminous Output

YEAR TO DATE	PRODUCTION
Nov. 14, 1959	347,198,000
Nov. 15, 1958	353,702,000

1959 output 1.8% behind 1958.
A month earlier output was 1.2% behind 1958.

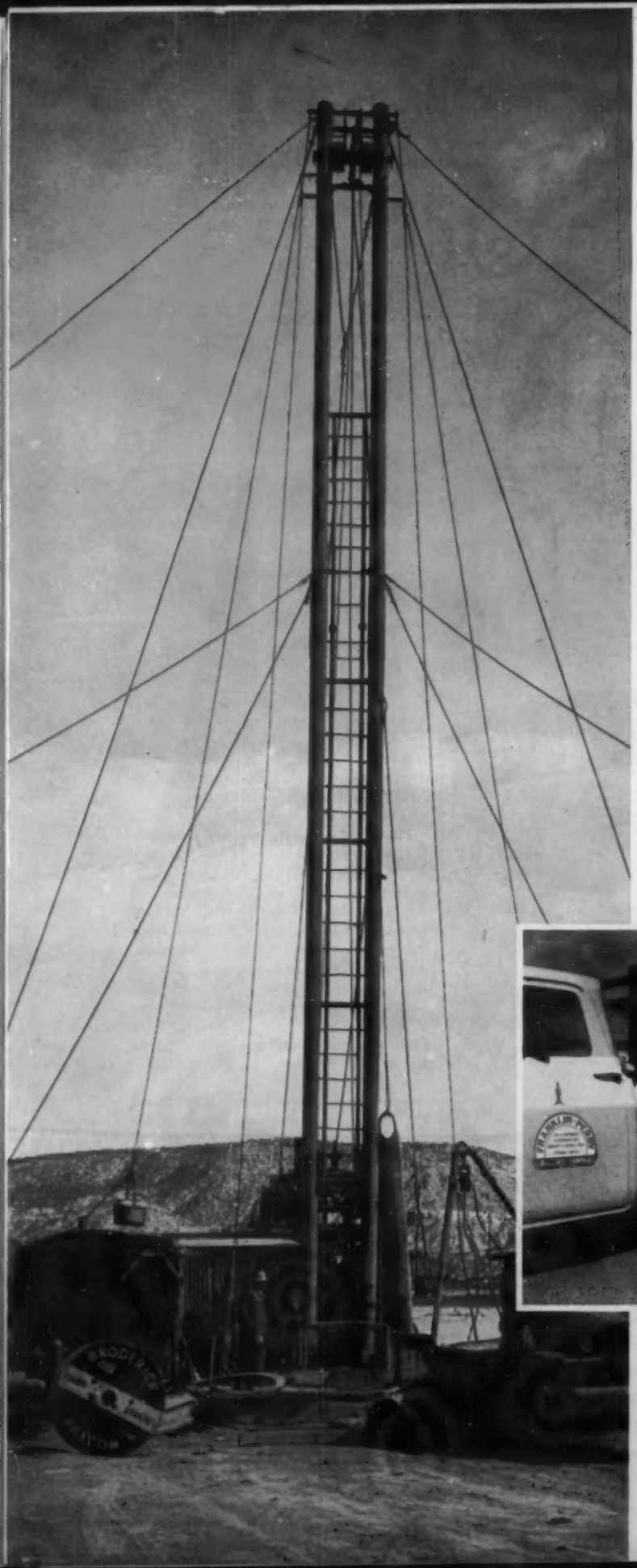
WEEK ENDING	PRODUCTION
Nov. 14, 1959	8,935,000
Nov. 15, 1958	8,759,000

Anthracite Output

YEAR TO DATE	PRODUCTION
Nov. 14, 1959	16,786,000
Nov. 15, 1958	18,469,000

1959 output 9.1% behind 1958.
A month earlier output was 10.4% behind 1958.

WEEK ENDING	PRODUCTION
Nov. 14, 1959	438,000
Nov. 15, 1958	398,000



Yellow Strand BRODRIL drills

URANIUM ESCAPE SHAFTS

To punch 4′ holes ¼-mile down into the largest uranium field in the world, Franklin & Perry Drilling Company, Ozona, Texas, put Yellow Strand BRODRIL to test. BRODRIL carries a 24″ spud to churn through the initial hole. Then it handles an 8,000 lb., 48″ reamer to finish drilling the giant-size shaft that is used for escape and vent.

1″ 6 x 21 left lay BRODRIL fiber core cable tool line is used on the spudder, and ⅞″ 6 x 7 Yellow Strand fiber core is used for the sand line.

"Our BRODRIL lines wear longer under the severe pressure, shock, and jarring pull-down than any other rope we've used," says E. D. Strickland, job superintendent.

Tell your B & B representative to show you how the high abrasion resistance, resiliency, specially fortified fiber core and long-lasting lubrication of Yellow Strand BRODRIL can help hit the pay zone faster! Broderick & Bascom Rope Co., 4203 Union Blvd., St. Louis 15, Mo.

Yellow Strand®

WIRE ROPE SLINGS CLIPS

the officers noted, started in 1955 and are long range, but are expected to be accelerated in the near future.

The Stonega Company, Mr. Leisenring pointed out, has spent in excess of $3 million since 1955 on the construction of two mines. During 1958, as part of the development program, a modern coke plant was completed at the cost of $1,850,000, the production of which is under contract to one customer. Contracts have been let for a new coke-crushing plant to be built adjacent to the ovens at a cost of $195,000 to permit the company to prepare and market coke of specified sizes.

Exploration—The Virginia Coal and Iron Company for the past six months, Mr. Knode said, has been carrying on an exploratory program which is larger than anything the company has attempted in the last 20 yr. "We have just completed drilling on the headwaters of Roaring Fork above the Pine Branch colliery and crews are now busy on the headwaters of Callahan and Mud Lick Creeks above the Stonega and Roda collieries. Upon completion of that drilling, we will decide the location for a new mine and cleaning plant in the Taggart Seam to cost between $2.5 and $3 million. We definitely have in mind, and plans are being now engineered, to build a new cleaning plant at the Glenbrook mine at an approximate cost of $800,000."

Benefits—The definite construction program will bring an increased production of coal with an increase of employment in the Appalachia-Big Stone Gap area, according to Mr. Knode, "The directors of our companies would not even consider these large expenditures if they did not think there is a bright future in the coal business here.

"We, who are in the management of the companies feel the steps we are taking and the developments we are planning, will bring a definite benefit to the local communities and we feel that the economic future of the area is extremely bright."

FASTEST WAY to keep coal MOVING from face to tipple

You can avoid costly loading-point bottle-necks by using STAMLER Car Spotters.

STAMLERS will move your coal FASTER . . . MORE EFFICIENTLY . . . and AT LESS COST than ANY OTHER METHOD! *This is proven by the production records of STAMLER users.*

In YOUR mine STAMLERS will pay for themselves in a surprisingly short time. Maintenance cost is so low as to be practically negligible. *The first STAMLER ever built is still in active use.*

STAMLER has 50% MORE car spotters in use than any other make! There must be a reason. Ask for details.

STAMLER Hydraulic CAR SPOTTERS

SCHROEDER BROTHERS, Exclusive Eastern Sales Agent, Pittsburgh, Pennsylvania
UNION INDUSTRIAL CORP., Carlsbad, New Mexico

W. R. STAMLER CORPORATION
PARIS, KENTUCKY

SALMON & CO., Birmingham, Alabama
WESTERN SALES ENGINEERING CO., Salt Lake City, Utah

Mines, Companies

Husky Oil Co. bought the Dickinson Briquetting Co. of Dickinson, N. D.

Husky reports the plant will continue to make industrial briquets from lignite. The plant will also begin manufacturing barbeque briquettes for home use. Acquisition of the Dickinson firm, said a Husky official, was an outgrowth of research and development carried on by Husky on coal carbonization.

Honeybrook Mines, Inc., will take over the operation of Glen Alden Corp.'s Audenried property in Hazleton, Pa.

The Audenried property consists of the Honeybook Collery with modern breaker and loading facilities, deep mining and strip operations. Honeybrook, owned by Correale Construction Co., of Hazleton, will continue to sell anthracite through the agencies of Blue Coal Corp., a sales subsidiary of Glen Alden. Total production this year is expected to be about 350,000 tons.

Amedeo Pancotti, former Knox Coal Co. miner, has received a medal for heroism, in recognition of his part in making possible the rescue of 32 men trapped in the Knox mine during the Jan. 22, 1959, disaster.

Mr. Pancotti with three other men dug through 30 ft of debris to reach the bottom of the 50-ft Eagle air shaft. Then he inched his way up by digging his hands and feet into the sides, finally reaching the top where he secured help. The Exeter, Pa., miner was among 35 persons in 17 states cited by the Carnegie Hero Fund Commission.

Considerable opposition from coal companies in the anthracite region is expected on the bill now before the

SELECT THE CABLE MADE BY THE FAMOUS "MINE-TO-MARKET" FAMILY . . .

Phelps Dodge Mining Cable

- Made of highest quality copper from Phelps Dodge's own open-pit mines.
- Combines years of Phelps Dodge mining "know-how" with many years of cable manufacturing experience to give you the finest quality cable you can specify.
- Assures utmost protection against damage from mechanical and electrical hazards in both above and below ground mining operations.
- Listed by the U. S. Bureau of Mines, and approved by the Department of Mines, Commonwealth of Pennsylvania, P-114-BM.

First for Lasting Quality—from Mine to Market!

PHELPS DODGE COPPER PRODUCTS
CORPORATION
300 Park Avenue, New York 22, N. Y.

PD

FALK Motoreducers driving log conveyor and refuse conveyor at the modern mill of The Bohemia Lumber Company, Culp Creek, Oregon.

FALK *all-steel* Motoreducers give you longer service life

Whether your load conditions are normal or heavy, the extra rigidity of all-steel construction (more than twice that of cast iron) maintains better alignment of revolving elements under load...a vital factor in prolonging the service life of gears and bearings.

And if your installations are subject to shock loads, or accidental external impacts, you're way ahead when you install Falk All-Steel Motoreducers. These rugged units do not destroy themselves by tearing off their feet under jamming overloads, nor are their housings subject to cracks which both dissipate the vital lubricant supply and allow revolving elements to get out of alignment.

All-steel construction is one of the built-in extras that you get in Falk Motoreducers. Others include: (1) 12 to 15% reserve load-carrying capacity in the gears (by AGMA standards), thanks to exclusive Falk extra-depth, high pressure angle helical gears; (2) maximum mechanical efficiency (98½% per gear mesh, under full load); (3) your choice of standard units (horizontal, vertical or right angle) to fit your precise requirements.

HORSEPOWER RANGE: to 75 hp . . . STANDARD OUTPUT SPEEDS: 780 rpm (high) to 1.2 rpm (low).

Prompt delivery from distributor stocks, or from warehouse or factory. Ask your Falk Representative or Authorized Falk Distributor for ***Bulletin 3100.***

THE FALK CORPORATION, MILWAUKEE 1, WIS.

MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS

Representatives and Distributors in most principal cities

FALK

...a good name in industry

Take your choice of all-steel drives when you specify Falk

THE FALK ALL-MOTOR MOTOREDUCER
...the original All-Motor unit

THE ALL-STEEL FALK SHAFT MOUNTED DRIVE

Torque ratings to 41,000 lb-in at low speed shaft. Also available in flange-mount design.

FALK and ALL-MOTOR are Registered Trademarks.

Rugged Kennametal U3RA Cutter Bits installed in new type chains on a 1 JCM continuous miner. Close-up shows the strong shank design.

How do YOU compare bits?

On the basis of . . . Bit life · Tonnage · Bit cost per ton?

KENNAMETAL BITS EXCEL ON ALL THREE COUNTS

At this West Virginia mine, bit costs averaged 5½ cents a ton, using standard carbide bits. Irregular occurrence of sulphur lenses and balls in the Pittsburgh No. 8 Seam sometimes jumped the average to 9 cents, with some sections running up to 67 cents. Tip failures occurred more often than in normal cutting, but breakage of the ½″ x 1″ shank was the big problem.

Switching to lower cost steel bits with hardfaced tips lowered bit costs considerably. But it also lowered production.

Kennametal U3RA Bits not only reduced shank breakage, but tip failures as well. The average bit cost dropped from 9 to 7 cents a ton . . . and production in heavy sulphur sections more than doubled.

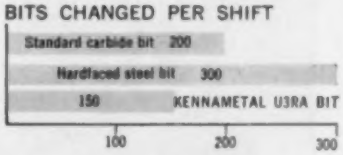
You can't pick good bits by appearance or price tags. Let the Kennametal difference show up in performance at *your* mine. Your Kennametal Representative will help you select and actually test Kennametal Bits in your mine. Call him, or contact us direct. KENNAMETAL INC., Mining Tool Division, Bedford, Pa. 97097

- Consistently high quality keeps Kennametal bits in service longer . . . resulting in fewer bit changes and more operating time at the face.
- Free-cutting design of Kennametal bits draws less power, permits faster cutting, maximum production, less maintenance.
- Every Kennametal bit is backed by 21 years of leadership in tungsten carbide tooling, including the development of the first carbide cutter bits for the American mining industry.
- Nineteen full-time Kennametal Representatives and the Kennametal Distributors—leading mine supply companies, provide assistance in solving your cutting and drilling problems and supply the tools you need . . . when you need them.

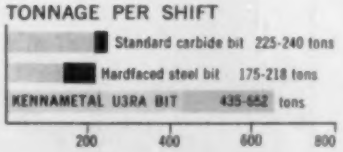
THE DIFFERENCE SHOWS UP IN PERFORMANCE

Different bits—same section—heavy sulphur

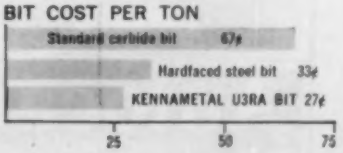
BITS CHANGED PER SHIFT



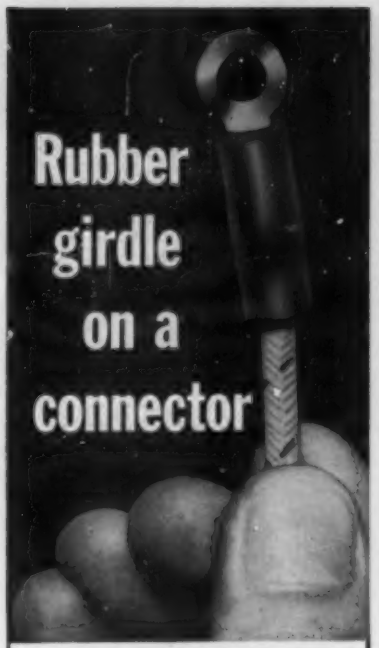
TONNAGE PER SHIFT



BIT COST PER TON



INDUSTRY AND KENNAMETAL
. . . Partners in Progress



...another reason why

Autocar is the "World's Finest"

Every terminal clip on Autocar wiring gets *double* protection: each one is pressure-applied, dipped in solder, then gets a rubber boot or girdle to cover the exposed soldered joint.

All wires exposed to weather get an extra covering of lumex or braid. Individual fuses or circuit breakers protect important circuits. Cab wiring is independent—connected by two oil- and dirt-proof terminal blocks.

"Extras" like these help make Autocar the "World's Finest" heavy hauler.

Autocar
"World's Finest"

Division of
The White Motor Company
Exton, Pennsylvania

WATCHING presentation of USBM 100% certificate to Ewing Watt, president, UMWA Dist. 3, are (left to right): B. Alimizi, UMWA representative; F. Heffers, T. McDonald, and W. Merritts, federal mine inspectors; J. B. Yanity, USBM safety instructor; Mr. Watt; and V. Leski and J. Kelly, UMWA representatives.

Pa. Mines Complete Safety Course

Taught by J. B. Yanity, safety instructor, United States Bureau of Mines, all 1,301 miners of 17 mines in Dist. 3 of the United Mines Workers of America, have achieved 100% completion in the USBM Accident Prevention Course.

In recognition of Dist. 3's outstanding performance, Ewing Watt, UMWA district president, received the John L. Lewis Certificate of Merit at a recent presentation. He was also given a certificate of award from the Bureau of Mines for 100% training achievement. Dist. 3 members received a pocket-card and diploma-type certificate from the Bureau for their participation in the safety program which covers virtually all phases of mine safety.

UMWA Districts 3, 4 and 5, comprising all mines in western Pennsylvania, will be 100% trained when a few remaining mines in Dist. 5 have completed the course. Supervising the three districts for the Bureau of Mines is Dan Walker Jr., with headquarters in Pittsburgh.

Mines, Companies *(Continued)*

Pennsylvania state legislature requiring coal firms to fill 50% of an abandoned stripping and backfill the rest of it at an angle of 45 deg to the surface.

The measure has already won House approval, 152 to 35. Public safety and saving of sites for housing and industry are key reasons given by those in favor of the bill.

Utilization

Contracts for 3,416,500 tons of coal valued at $12,047,895, have been announced by the Tennessee Valley Authority.

The tonnage is divided among five producing fields as follows: Southern Illinois—156,000 tons; West Kentucky—522,500 tons; East Kentucky—1,560,000 tons; East Tennessee—936,000 tons; and Southwest Virginia—242,000 tons.

A new long-term contract for delivery of coal from the Crown mine of Freeman Coal Mining Corp. to generating stations of the Commonwealth Edison Co. has been signed by the two firms.

Beginning next spring, shipments will be increased a half million tons per year. Under terms of the contract 1 million tons per year from this mine will be shipped to Commonwealth's plants. The Crown mine has been shipping regularly to the utility firm since 1952.

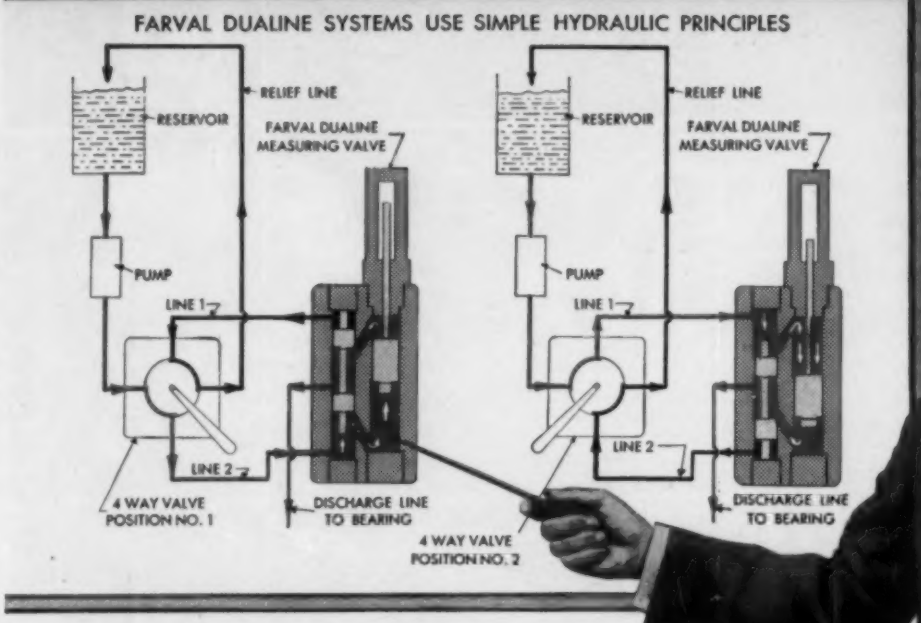
The proposed coal-fired steam generating plant in the Lake Cle Elum area of Kittitas County, Wash., probably will be delayed 2 or 3 yr because of a lack of power purchasers, according to Horace Fleming, manager of the Kittitas County Public Utility Dist.

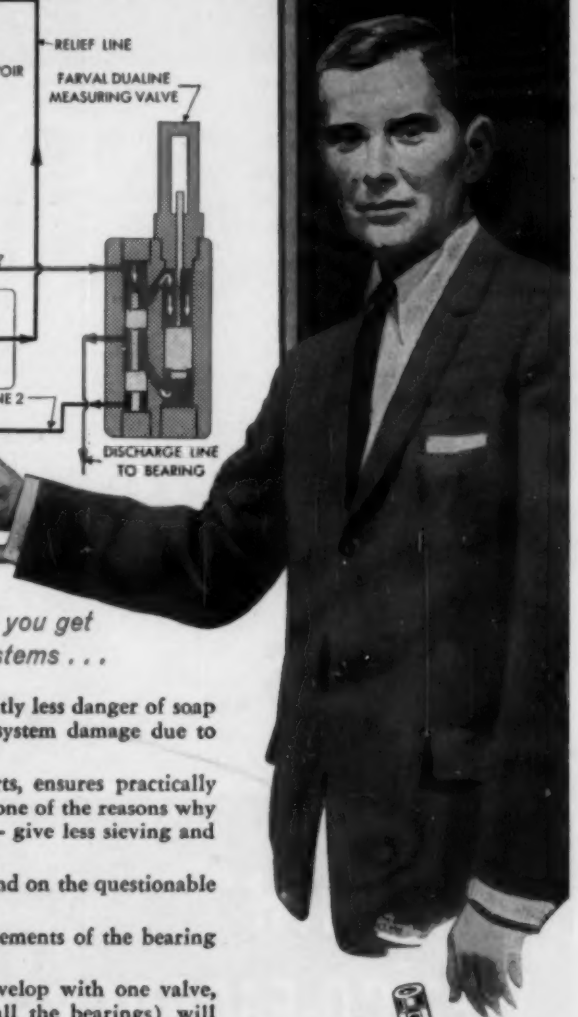
Mr. Fleming said that the plant project hinges on general economic conditions in the Northwest and power supply factors in the area. He noted that a number of utilities in the region already are committed to purchase power from dams still under construction.

(Continued on p 58)

FARVAL
—Studies in Centralized Lubrication
No. 246

"For positive lubrication of large, medium and heavy-duty installations . . . it's a Farval Dualine System!"





With Farval Dualine centralized lubricating systems you get the following distinct advantages over other type systems . . .

(a) Much lower operating pressures with consequently less danger of soap separation on grease systems. Also, less danger of system damage due to high lubricant pressures.

(b) Large lubricant passages with no pinhole ports, ensures practically full pump pressure for every metering valve. This is one of the reasons why Farval Dualine systems operate on lower pressures — give less sieving and working of lubricants.

(c) Positive indication at each bearing — does not have to depend on the questionable action of a single indicator at the pump.

(d) Each metering valve individually adjustable for the requirements of the bearing it serves.

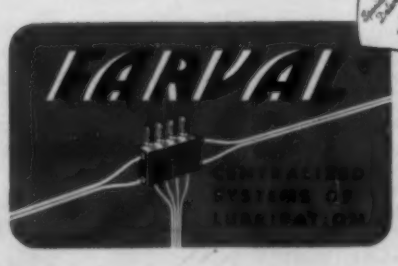
(e) Independent metering valve operation. Should trouble develop with one valve, the system will continue to operate. Only one bearing (not all the bearings) will require hand lubrication until trouble is corrected.

(f) True lubricant metering. Quantity of lubricant delivered to one bearing is not dependent on any other valve in the system.

(g) Much easier to spot and correct trouble.

Check with your Farval Representative and see how these versatile systems can improve production operations — reduce costs. Or write for free Bulletin 26-T containing complete engineering information on Farval Dualine systems. The Farval Corporation, 3288 East 80th Street, Cleveland 4, Ohio.

Affiliate of The Cleveland Worm & Gear Company
A subsidiary of Eaton Manufacturing Company



WEMCO-FAGERGREN FOR FINE COAL FLOTATION

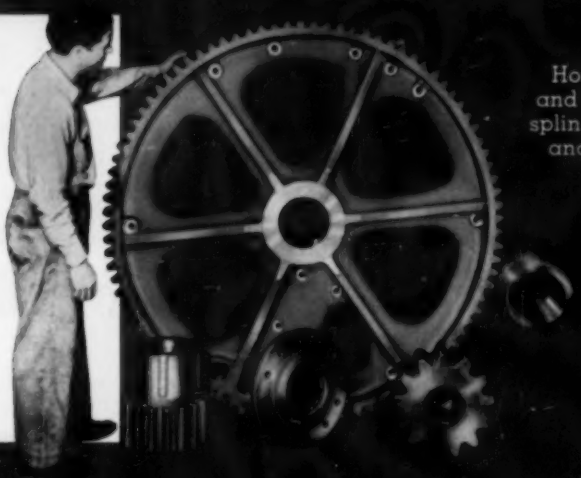
WEMCO®

a division of
Western Machinery Company, *Dept. C. A.*
650 Fifth St., San Francisco, Calif.
and throughout the world

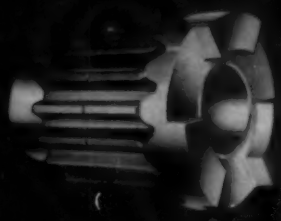
Coal operators now have a solution to washery water reclamation and stream pollution problems, producing, at the same time, a marketable fine coal product! Wemco-Fagergren Flotation Machines are at work in a number of installations, proved in low-cost, efficient recovery of clean coal fines, removal of solids from cleaning plant water and clarification of water for re-use in closed plant systems.

If you have a coal recovery problem, chances are that Fags can turn it to advantage. Ask for complete information now!

take a good look at these TSP hardened products



Hoist gear and pinion—splined pinion and spider

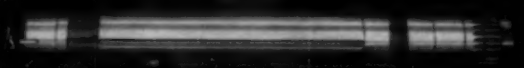


Walking pinions

Vertical swing gears

Spur gears and shaft pinions

Double staggered tooth continuous miner sprocket



Continuous miner shaft

Continuous miner splined shaft

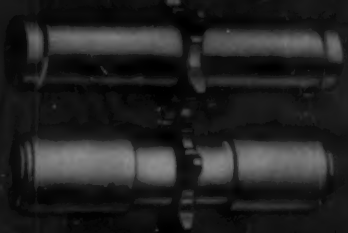
Bevel gears and pinions

Sheave wheels and pins

Splined bore continuous miner sprocket

Cab rollers

Conveyor rolls



Cat drive clutches

Continuous miner sprocket tube and hub assembly

Illustrated here are a few of the hundreds of "Tool Steel Process" products especially designed and made for the rugged service requirements of the mining industry, both underground and strip. In serving the entire mining industry, The Tool Steel Gear & Pinion Co. has saved thousands of dollars in replacement costs alone, for each of the companies using TSP hardened products. TSP products are hardened by our special process. The file hard surface to full depth of permissible wear gives maximum life. The core, refined for toughness and ductility, gives maximum strength. The result is TSP products last many times longer than ordinary products. Our famous written guarantee goes with all TSP products. A copy of this written guarantee will be sent to you free upon request.

TOOL STEEL GEAR AND PINION CO.

CINCINNATI 16, OHIO, U.S.A.

The Standard of Quality Since 1909 for Gears, Pinions, Rolls, Wheels and Other Hardened Products

Fletcher EXTENDED-HEAD Roof Drills Bring NEW ACCESSIBILITY OF CONTROLS ...INCREASED OPERATOR EFFICIENCY... For Faster, Safer, Bolt Installation!

FLETCHER Roof Control Drills now provide the advantage of extended head design on all standard models. Operators stand away from the face and away from the rib, *regardless of where bolt is to be installed*. Control handles on both sides of head work in the same direction for easier, surer operation.

Your drillers will find that they can do their job faster with this new control system. *And maintenance men will like the new accessibility of the "packaged controls"*. All valves are bolted to a drop-in plate, permitting them to be removed as an assembly. Fewer hoses need be disconnected to reach the point requiring service . . . and less service is required . . . because of their protected location within the body of the head extension.

Coupled with the advantages of long, fast, telescoping stroke . . . high thrust . . . and all-hydraulic positioning, *FLETCHER Drills give you two-man results with ONE-man operation.* NOW is the time to cut your roof control expense with fast, efficient, economical FLETCHER Drills. Let us talk to you about the new standard designs . . . or *specials to meet your specific requirements.*

FEATURES

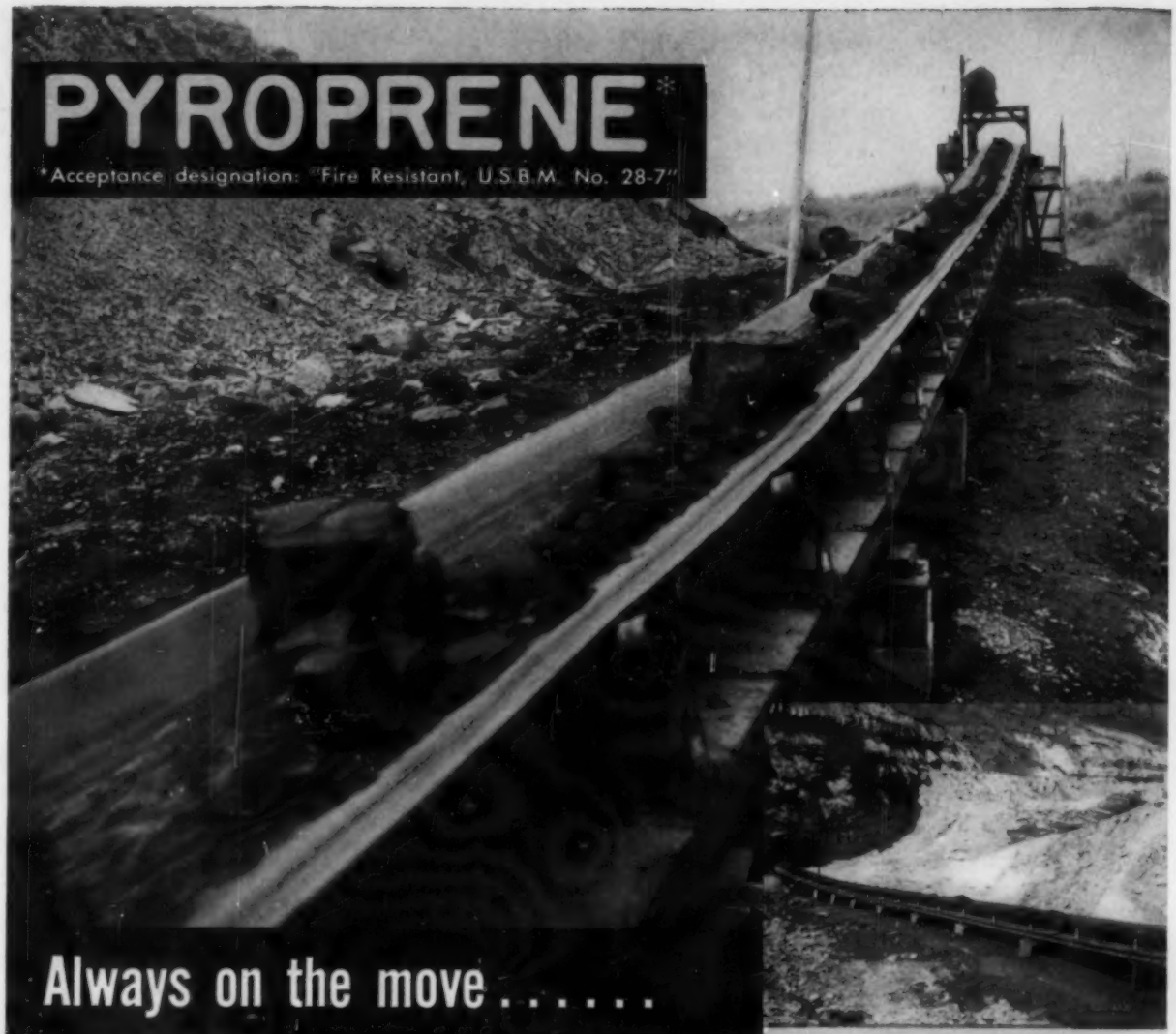
- Jack-feed system delivers maximum smooth thrust with quick raise and return.
- Hydraulic lowering device lets you drill directly from the mine floor.
- Hydro-slide moves your drill across the place smoothly, accurately and fast.
- Compact frame and third-wheel steer makes tramming quick and easy.
- Height range from 28-inches to 14-feet lets you select a drill to exactly fit your mine.
- Telescoping mast gives full stroke in varying seam conditions. And the new floor-to-roof mast gives added safety, speed and power.

Fletcher
ROOF CONTROL DRILLS

J. H. FLETCHER & CO. | P. O. Box 2143, HUNTINGTON 18, WEST VIRGINIA
JAckson 5-7811

PYROPRENE*

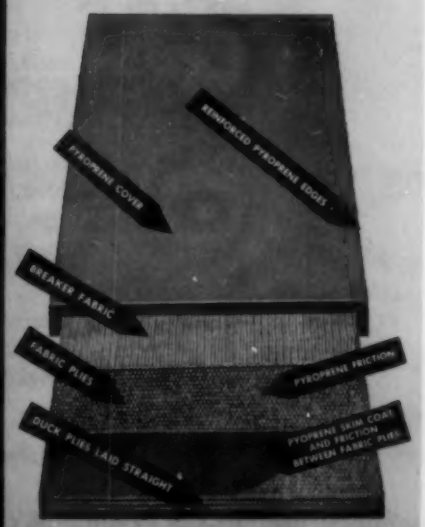
*Acceptance designation: "Fire Resistant, U.S.B.M. No. 28-7"



Always on the move . . . . . 1,500,000 tons per year

Huge sharp-edged pieces ride over ½ mile on the Acme-Hamilton Pyroprene Belt which is running on a Barber-Greene conveyor. Over a million and a half tons of coal a year travel on this belt. Trouble is non-existent. Proof-positive that Acme-Hamilton belts haul top capacity loads for longer periods with no loss of time, or maintenance.

Fire Resistant Pyroprene Compound, used in Acme-Hamilton U.S.B.M. accepted belts, will not feed or spread fire. The cover is Pyroprene; fabric plies and breaker fabric are sealed with Pyroprene before the belt is built. Cover has exceptional resistance to cutting, abrasion and gouging. Write Acme-Hamilton, Dept. CA-92.



Acme Hamilton

MANUFACTURING CORPORATION, TRENTON 3, N. J.

Divisions: Acme Rubber Mfg. Co. • Hamilton Rubber Mfg. Corp.

ATLANTA • CHICAGO • DETROIT • HOUSTON • INDIANAPOLIS • LOS ANGELES
MILWAUKEE • NEW YORK • PITTSBURGH • SALT LAKE CITY • SAN FRANCISCO • SEATTLE

STOP

CABLE FAILURE

Put the "hex" on off-track mining machine down time .... with the new Collyer Twin Type G Portable Power Cable with hex-shaped parallel conductors. This construction *locks conductor assemblies in place,* prevents twisting and shifting, assures longer flexing life . . . AND LONGER CABLE LIFE!

Insulated with heat-resistant natural rubber . . . sheathed with Collyer's tougher, more durable Neoprene sheath compound to give greater resistance to abrasion, tearing, crushing. Compression cutting is "hexed", too, by natural rubber insulation!

Write today for complete information on how this new cable can put a stop to resplicing down-time and replacement overhead.

Collyer

COLLYER INSULATED WIRE CO.
257 ROOSEVELT AVENUE
PAWTUCKET, RHODE ISLAND

Utilization *(Continued)*

Construction of a pilot plant to make road binder from North Fork Valley, Colo., coal is under consideration. The binder, said to have several advantages over asphalt, was developed recently by Curtiss-Wright Corp.

William Bear, a Somerset, Colo., coal operator, told the Delta County Chamber of Commerce recently that Curtiss-Wright Corp. had indicated a willingness to operate the facility if the Colorado Dept. of Highways would construct the plant. Western Colorado coal was described by Mr. Bear as being ideal for the process due to low moisture content and high volatility.

What is described as the largest steam generating plant in the United States, to burn North Dakota lignite, was unveiled to the public at Fergus Falls, Minn., Nov. 20.

Built by Otter Tail Power Co. as an addition to its Hoot Lake Station, the $11 million plant will use more than 1,000 tons of lignite a day. More than 5 yr of planning and 2 yr of construction went into the 53,500-kw plant.

Four large coal companies and the United Mine Workers of America have asked the Illinois Commerce Commission to prohibit the sale of natural gas as a boiler fuel in the state.

The firms are the Freeman Coal Mining Corp., Truax-Traer Coal Co. and the United Electric Coal Co., all of Chicago, and the Peabody Coal Co., of St. Louis. The petition, which named as respondents Northern Illinois Gas Co. and the Peoples Gas, Light & Coke Co., contended the sale of natural gas for boiler fuel is an inferior and wasteful use against public interest.

A total of 18,063 children have attended summer recreation camps operated by Eastern Gas & Fuel Associates during the past 25 yr.

Eastern has been operating the camps, open to the sons and daughters of its mine and store employees, since 1935, it is pointed out in a 25th anniversary booklet just published. The booklet, which summarizes 1959 activities at two of West Virginia's camps, including Thomas E. Lightfoot, near Hinton, and Camp Washington-Carver, near Beckley, describes the benefits of the program and has pictures and illustrations.

Meetings

American Institute of Mining, Metallurgical & Petroleum Engineers, Inc., annual meeting, Feb. 14-18, 1960—New York, N. Y.

How to simplify lubrication underground

By using *multipurpose* oils and greases, you can drastically reduce the number of lubricants needed for your underground equipment. In some mines, Texaco Lubrication Engineers have even gone so far as to set up an effective lubrication program using only two lubricants!

Think what a simplified lubrication plan like this could save you—in storage and handling costs, in reduced inventory and, above all, in eliminating the dangers of misapplication. And—you could ask no better assurance of dependable, uninterrupted production and lower maintenance costs.

Let a Texaco Lubrication Engineer work out a simplified lubrication plan for your operation. Just call the nearest of the more than 2,300 Texaco Distributing Plants, or write to:

☆ ☆ ☆

Texaco Inc., 135 East 42nd Street, New York 17, N. Y.

Tune In: Texaco Huntley-Brinkley Report, Mon.-Fri.-NBC-TV

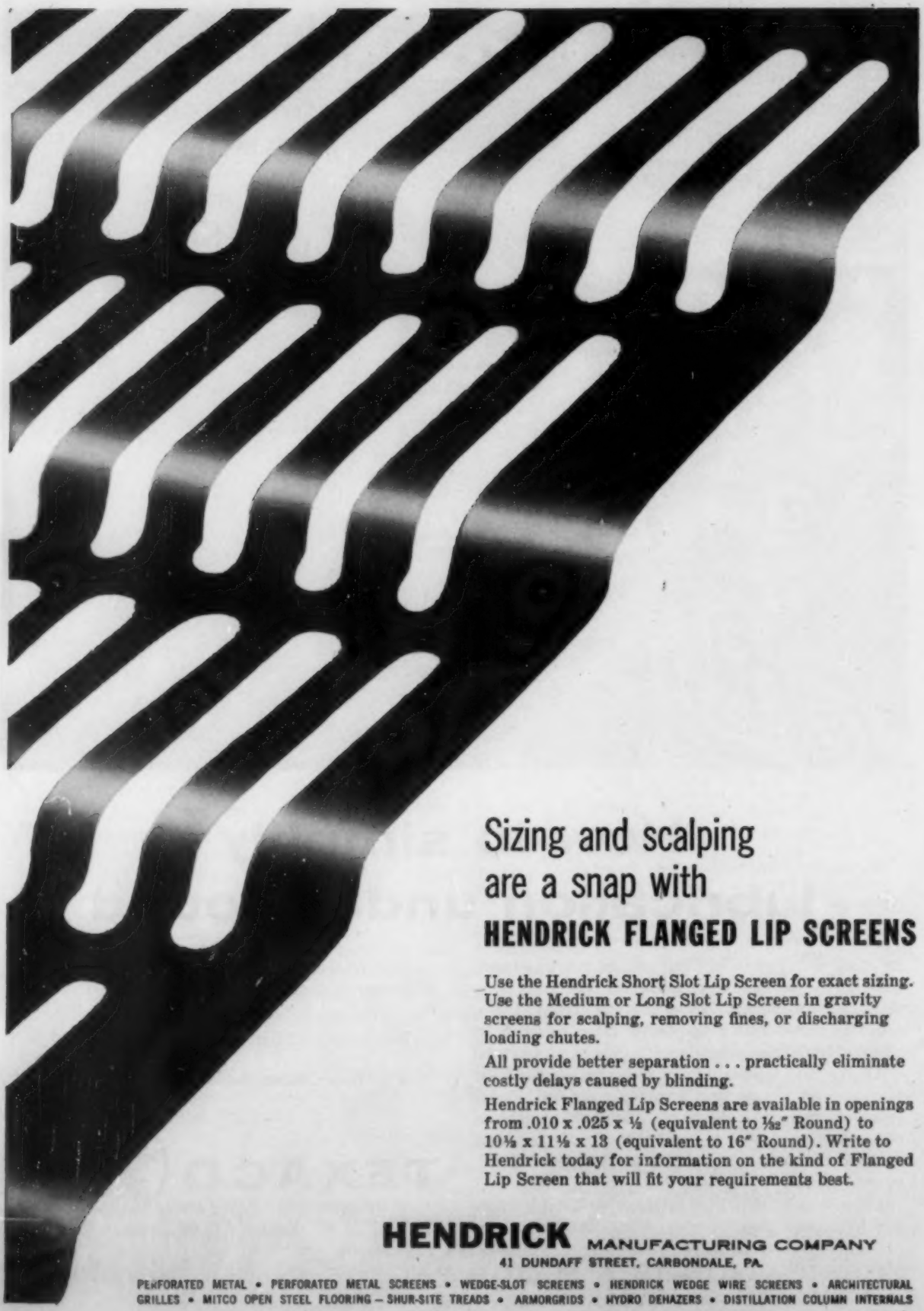
TEXACO

Throughout the United States

Canada • Latin America • West Africa

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)



Sizing and scalping are a snap with

HENDRICK FLANGED LIP SCREENS

Use the Hendrick Short Slot Lip Screen for exact sizing. Use the Medium or Long Slot Lip Screen in gravity screens for scalping, removing fines, or discharging loading chutes.

All provide better separation . . . practically eliminate costly delays caused by blinding.

Hendrick Flanged Lip Screens are available in openings from .010 x .025 x ½ (equivalent to ½₂" Round) to 10⅛ x 11⅛ x 13 (equivalent to 16" Round). Write to Hendrick today for information on the kind of Flanged Lip Screen that will fit your requirements best.

HENDRICK MANUFACTURING COMPANY

41 DUNDAFF STREET, CARBONDALE, PA.

PERFORATED METAL • PERFORATED METAL SCREENS • WEDGE-SLOT SCREENS • HENDRICK WEDGE WIRE SCREENS • ARCHITECTURAL GRILLES • MITCO OPEN STEEL FLOORING – SHUR-SITE TREADS • ARMORGRIDS • HYDRO DEHAZERS • DISTILLATION COLUMN INTERNALS

YARDS AHEAD

WHEN PRODUCTION COUNTS

HEAPS IN A HURRY — cuts minutes from the miles . . . That's why the Curtiss-Wright CW-215 moves the most dirt — makes the most profit for contractors like R. C. Wetherall, shown here working on a West Virginia road job . . . This hustling pair of 215s consistently pack in heaping loads of clay, shale and rock — and really keep the pusher operator hopping to keep up with their fast cycles.

UNUSUAL MACHINE? Not really! You'll find the same high performance in the entire CW line — from the 7 cu. yd. CW-27 to the big CW-226, largest two axle scraper on the market. Check any model against your job requirements . . . put "Yards Ahead" performance to work for you.

AD NO. 52-48

CURTISS-WRIGHT MODEL

215

CW-215 SELF-PROPELLED SCRAPER

Capacities: 15 cu. yds. struck, 21 cu. yds. heaped, 42,000 pound rated load

SALES • SERVICE • PARTS

at your

CURTISS-WRIGHT DISTRIBUTOR

SOUTH BEND DIV. CURTISS-WRIGHT CORPORATION, SOUTH BEND, INDIANA

SOUTH BEND DIVISION

CURTISS-WRIGHT

CORPORATION

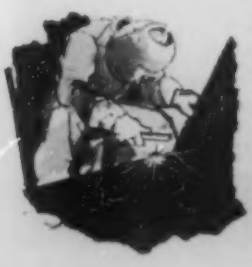
SOUTH BEND, INDIANA

GET TOUGH

WITH LUKENS "T-1" STEEL

TRADEMARK

Where the going gets rough, versatile Lukens "T-1" steel fights back. For repair or modification of heavy duty equipment such as truck beds, chutes, bucket teeth and dozer blades, this special duty steel plate can be ordered from *warehouse stock* in a wide range of plate sizes and gages. Lukens "T-1" is the modern mining steel—you can work and weld it in the field as readily as in your shop. Its terrific resistance to abrasive impact—coupled with an extremely high yield strength—means fewer replacements and often greater payloads. That's why more and more equipment builders are using Lukens "T-1" to provide longer life in shovel buckets, trucks and other mining equipment. Remember to specify the extra-tough 321 min. BHN quality. For performance and application details, request our special booklet, "Lukens 'T-1' for Toughness." Address Manager, Application Engineering Dept., M129 Services Bldg., Lukens Steel Company, Coatesville, Pennsylvania.

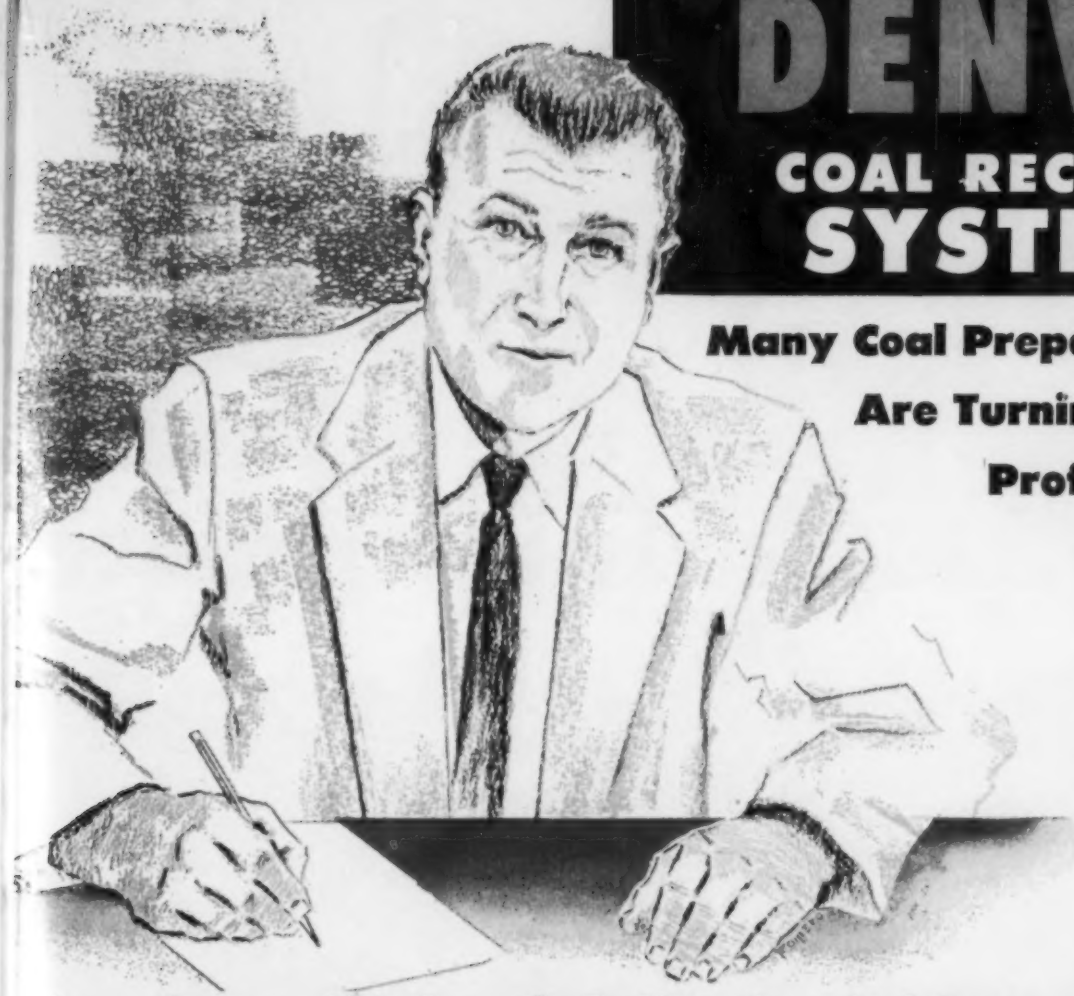


These warehouses can supply you with Lukens "T-1" steel plate...

Alabama, BIRMINGHAM 2, O'Neal Steel, Inc., P.O. Box 2623 • **California,** LOS ANGELES 54, Earle M. Jorgensen Co., P.O. Box 2358, Terminal Annex, 10650 S. Alameda St. • LOS ANGELES 33, The R. J. M. Company, 238-248 South Mission Rd. • **Illinois,** CHICAGO 8, Joseph T. Ryerson & Son, Inc., 16th and Rockwell Sts. • **Kentucky,** ASHLAND, Mansbach Steel Co., 19th St. and River Front • **Maryland,** BALTIMORE 2, Wm. G. Wetherall, Inc. 317 President St. • **New Mexico,** ALBUQUERQUE, Miller and Smith Mfg. Co., Inc., 500 Phoenix Ave., N. W. • **Ohio,** CLEVELAND 6, Mills-Wolf Steel Co., 12434 Cedar Rd. • **Oregon,** PORTLAND 4, J. E. Haseltine & Co., 115 S. W. Second Ave. • **Pennsylvania,** McKEES ROCKS, Follansbee Steel Co., 200 Bradley St. • **Quebec,** MONTREAL, Drummond, McCall & Co., Ltd. 930 Wellington St. • **Utah,** SALT LAKE CITY, Structural Steel & Forge Co., P. O. Box 300 • **Washington,** SEATTLE 4, Stack Steel & Supply Co., 500 Landers St. • SPOKANE 10, Union Iron Works, East 217 Montgomery Ave., P. O. Box 2135.

LUKENS ®

DENVER
COAL RECOVERY SYSTEMS



Many Coal Preparation Plants Are Turning Waste Into Profits and at the same time . . .

(1) Recover marketable fines from waste water

(2) Remove solids from washery waste and simplify disposal

(3) Reclaim water in a closed water system

Compare This Example To Your Own Coal Preparation Plant:

(A) 1,000 G.P.M. WASHERY WATER IS SENT TO WASTE.

(B) WASTE WATER CONTAINS 10% SOLIDS AT 20% ASH.

(C) SOLIDS REPRESENT 26 TONS PER HOUR AND CONTAINS 84% COAL THAT RUNS 5% ASH.

All washery solids (−28 mesh x 0) are sent to a simple Denver Coal Recovery System which, for this capacity, costs about $86,000 to $90,000, plus approximately $64,000 to $100,000 for installation. (Estimated total approximately $150,000 to $200,000.)

Ash in solids, reduced by Denver "Sub-A" Coal Flotation from 20% to 5%, is blended with coarse coal.

Efficiency of system is approximately 92% and produces some 20 tons per hour of 5% ash coal.

Solids in refuse effluent are dewatered to approximately 40% moisture and conveyed to waste.

Clear water overflow is recycled to plant. Efficiency of closed water system requires only approximately 42 g.p.m. make-up water to replace water lost in clean coal and dewatered refuse.

Total coal fines recovered: 20 tons per hour (280 tons per 14 hr. day) @ $5.00 per ton yields $7000 per 5 day week or $350,000.00 per year.

Operating personnel, overhead and maintenance are low.

The increased coal recovery from the fines should pay for this equipment and installation in less than six months and will accomplish these objectives:

(1) Recover Clean Coal Fines
(2) Remove solids from washery wastes and simplify disposal
(3) Reclaim water and close plant water system.

DENVER Equipment Company can supply you a complete, centralized service on Coal Recovery Systems. Estimates and projections based on reliable laboratory test information are available without cost to you. We invite you to use our experience in the fine coal recovery field. Write today!

"The firm that makes its friends happier, healthier and wealthier"

STANDARD RELIABLE 24 HOUR SERVICE EFFICIENT

DENVER EQUIPMENT COMPANY

DENVER 17, COLORADO Phone CHerry 4-4466 1400 SEVENTEENTH ST.

NEW CAT DW20 4-wheel, 345 HP Series G Tractor with 24 cu. yd. No. 482 Scraper

NEW CAT DW21 2-wheel, 345 HP Series G Tractor with 19.5 cu. yd. No. 470 Scraper

NEW CAT No. 619 2-wheel, 225 HP Series B Tractor with 14 cu. yd. No. 442 Scraper

SERVICE EFFICIENT
DENVER 17, COLORADO Phone CHerry 4-4466 1400 SEVENTEENTH ST.

BIG NEW CAT WHEEL RIGS CUT PRODUCTION COSTS

You name the job...these new Cat Wheel Tractors and matching LOWBOWL Scrapers can do it better with faster cycles and greater production, at lower cost. For example:

DW20-DW21 Series G Tractors and matching LOWBOWL Scrapers Now these big wheel tractors develop 345 HP—an increase of 8% over former units. Both tractors have 12% more rimpull than before—the DW20 develops 39,565 lb. (maximum) rimpull, and the DW21 has 49,100 lb. (maximum) rimpull. As a result, the new rigs travel faster (up to 20%) under similar haul road conditions. To accommodate this greater power and capacity, improvements have also been made in transmission and final drive.

Matching the increased horsepower and productivity of the Series G Wheel Tractors are the new No. 456 and No. 470 Series B LOWBOWL Scrapers. Rating is increased 8% to 19.5 cu. yd. struck and 27 cu. yd. heaped. (Rating on the No. 482 is 24 cu. yd. struck and 34 cu. yd. heaped.) Bowl, draft frame and apron are strengthened for greater resistance to tough materials and rugged loading—withstand higher loading stresses.

No. 619 Series B Wheel Tractor and No. 442 Series B LOWBOWL Scraper Here is the latest addition to the Caterpillar line of high-speed earthmoving equipment. This brand-new earthmover is a 14 cu. yd. struck (18 cu. yd. heaped) unit featuring ground-hugging roadability, "years ahead" service-accessibility, and high productivity. The No. 619 has a turbocharged 225 HP engine (and high torque rise), planetary final drives, unit construction, tubeless tires, a swing-away dash, 2-jack steering, and a dry-type air cleaner, providing the design and performance features that insure superior workability on a broad range of applications. All this in the new No. 619-No. 442 unit—plus proved economy over any earthmover of comparable size.

DW15 Series F Wheel Tractor and No. 428 LOWBOWL Scraper Greater strength and productivity in the well-known four-wheel DW15-No. 428. Bevel gear and pinion, differential and front wheel spindles offer increased service life. Machine delivers 200 HP. The big LOWBOWL Scraper handles 13 cu. yd. struck, 18 cu. yd. heaped. Can be unhitched to haul other units.

Plan your work around these new Cat Wheel Rigs for top production at lowest cost: The DW20-DW21 Series G, the new No. 619 and the DW15 Series F. The complete facts are at your Caterpillar Dealer. Call him today for a demonstration.

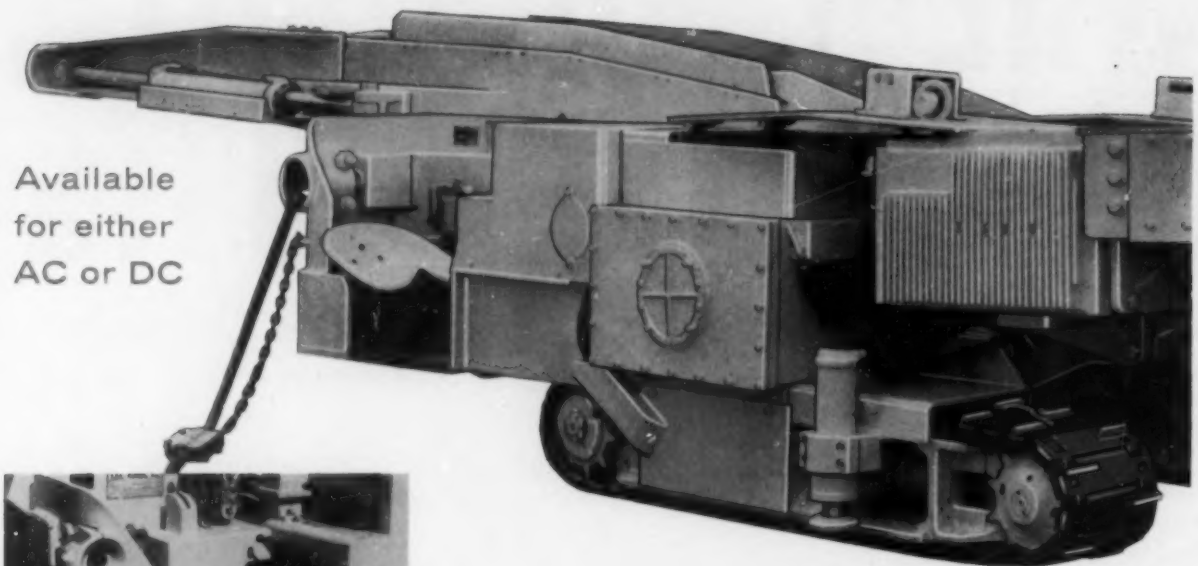
Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR

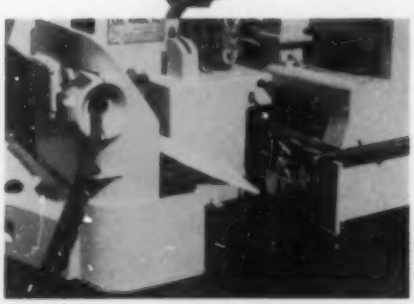
Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

BORN OF RESEARCH
PROVED IN THE FIELD

LIGHTWEIGHT COST *plus* HEAVYWEIGHT *equals* PRODUCTION



Available for either AC or DC



OPERATOR'S PLATFORM

Compact and convenient hydraulic and electrical controls are within easy reach of the operator. Throttle valve precisely controls the speed of all hydraulic operations as well as providing "deadman" control.

16" WIDE CRAWLER

The new crawler with heavy-duty gearing can operate the miner on steep grades and also float on soft bottom.

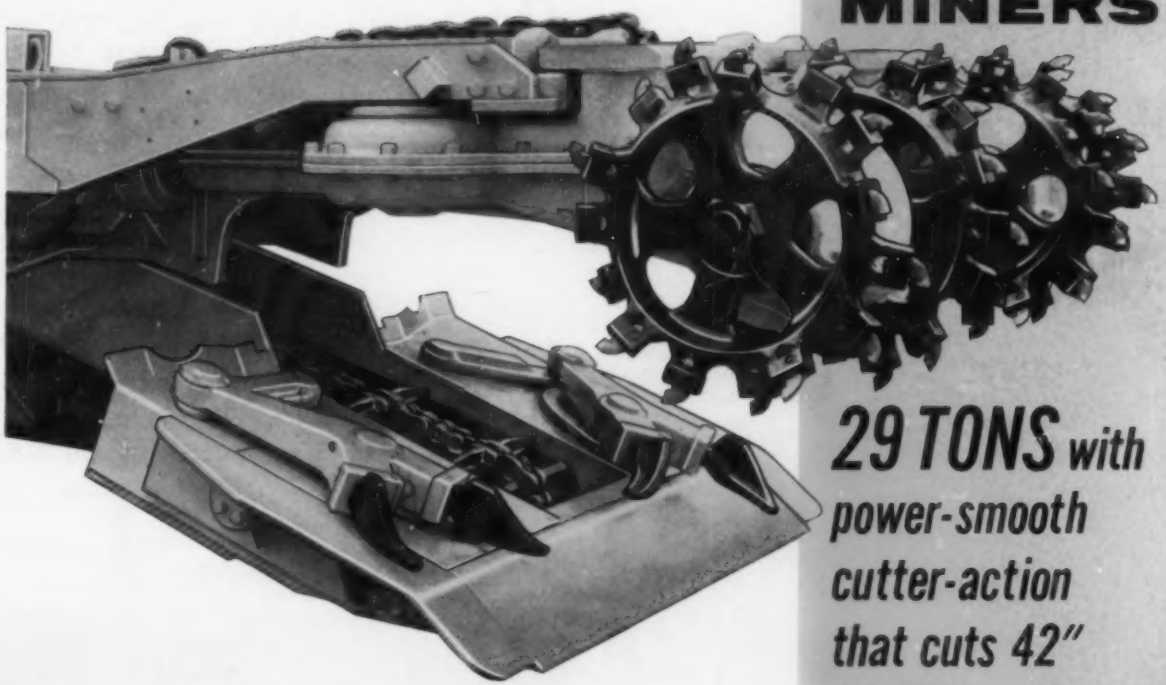
Less than 25 P.S.I. ground pressure.

GATHERING HEAD

The exclusive "dual gathering arms" provide maximum reach and much better flow to the conveyor.

PERFORMANCE PUNCH

Lee-Norse CM38 and CM48 MINERS



29 TONS with power-smooth cutter-action that cuts 42" to 120" seams and gathers loads as fast as they are cut

CUTTING HEADS

New "Rap-Lok*" Cutter Bits, spaced evenly around cutter rim, provides smooth, vibrationless performance. Extremely quick "bit change"—no set screws—long bit life.

*Trade Mark of The Cincinnati Mine Machinery Co.

Lee-Norse Company

CHARLEROI, PENNA.

Specialists in Coal Mining Equipment

Coal high or low?... Lee-Norse MINERS keep production on the go!

HAULS OF

HERE ARE on-the-job stories of five United States Rubber Conveyor Belts, taken from "U.S." belt records in the coal mining industry.

These belts are just some of the "U.S." standouts which demonstrate, year after year, why "U.S." is the world's largest producer of conveyor belts.

For steady, day-in and day-out dependability in conveyor belting, it always pays you to secure the advantages of "U.S." Engineering. "U.S." Engineers work directly with "U.S." Distributors or original equipment manufacturers to assure their obtaining the right belt recommendations for each type of conveying.

The most comprehensive belting engineering information in the industry is available through your "U.S." Distributor. It will pay you to check with him.

U. S. CONVEYOR BELTS

"A revolution in strip mining," says superintendent, "U.S. Conveyor Belt helps us save $1500 per week."

The Will Scarlet mine near Stonefort, Ill., has an outstandingly successful use of the first overland belt conveyor in a strip mine. The conveyor belt system, using a U. S. Giant® Belt, reduces the number of trucks, eliminates extra roads and high maintenance costs. The belt makes possible economical stockpiling for continuous operation: miners can continue working without a tipple operation—or the tipple can produce without a mining operation. The system can be moved to any location on the 3,000-acre tract. As the pit progresses overland, more lengths are simply added to the belt. "Maintenance costs are very low. Our savings are $1500 per week. We intend to install additional 'U. S.' Belting soon." *Another Three-Way Engineering Triumph.*

"After 20 years, 'U.S.' still gets the replacements," says plant foreman

Mr. James Campbell of Guyan-Eagle Coal Co., Kelly, West Va., knows why Guyan-Eagle has been using (and replacing with) "U. S." belts in their 5 mines. In the words of the company's own officials, "U. S." Belts are:

"The most dependable in our experience."
"Resistant to abrasive action of rock."
"Strong, durable—maintenance is minimum."

FAME

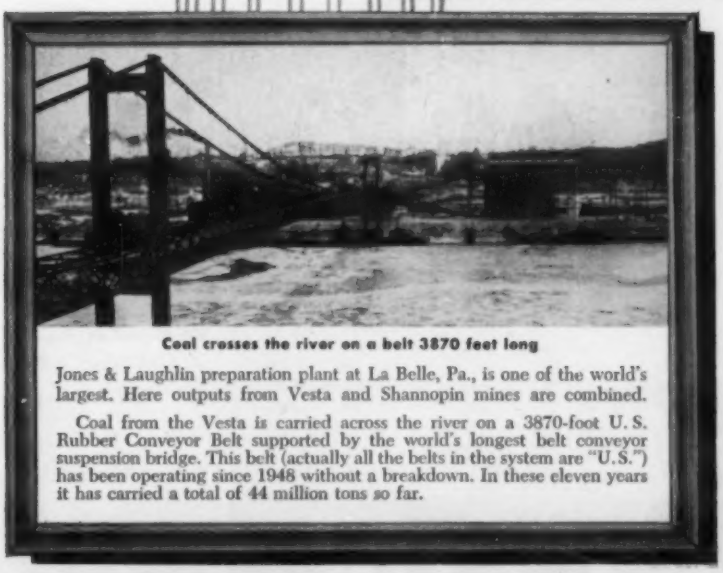
40,000,000 tons of washed coal

This is the minimum tonnage expected to be hauled in an estimated 12-year life by the main "U.S." belt. Installed in U.S. Steel's Robena Coal Mine, Uniontown, Pa. Robena is three mines, serviced by the same preparation plant. It is one of the largest coal-producing units in the nation. A single U.S. Rubber slope belt (installed 1953) conveys all the washed coal, amounting to over 20,000 tons a day. An earlier "U.S." Belt (installed in 1951) conveys coal to the blending bins.

AUTOMATION GOES UNDERGROUND

"U. S." Belts help make foolproof the push-button conveyor system in the Dana Slope Mine of Amherst Coal Co., (Rensford, West Va.).

Limited storage capacity, both inside the mine and on the surface, makes it mandatory that this slope conveyor operate without stoppage. So Amherst, knowing the "U. S." reputation for dependability and long life, selected a 42" U. S. Giant 6-ply YN belt. Operating since 1952, it has given completely trouble-free service.



Coal crosses the river on a belt 3870 feet long

Jones & Laughlin preparation plant at La Belle, Pa., is one of the world's largest. Here outputs from Vesta and Shannopin mines are combined.

Coal from the Vesta is carried across the river on a 3870-foot U. S. Rubber Conveyor Belt supported by the world's longest belt conveyor suspension bridge. This belt (actually all the belts in the system are "U.S.") has been operating since 1948 without a breakdown. In these eleven years it has carried a total of 44 million tons so far.

US RUBBER

Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.

Get DOUBLE EXPANSION for DEPENDABLE roof support with PATTIN roof bolts and expansion shells

STYLE D-1

The unique double expansion feature of all Pattin expansion shells insures *dependable* roof support, in hard or soft roof conditions. Their double holding power guards against failure — even under a 20 ton pull!

Pattin features include a parallel contact with the hole, and no definite drilling depth is required, as the shell can be securely anchored at any place in the hole. They anchor solidly and will not turn while being tightened. Wedge and shell are assembled in a manner to prevent loss of parts in handling, and the bolt and shell assembly are furnished as a complete unit. Plates are bundled separately. No special nuts or ears are required on the bolts. These features make a safer roof — and a safer roof means fewer accidents, increased production, more clearance for equipment operation and better ventilation.

Pattin specializes in roof bolting —it's our business, not just a sideline! Your business is important to us, and our service engineers are always available for consultation on your roof problems—ready to give you service when you need it! WRITE OR PHONE US TODAY for complete details.

Reg., U.S. and foreign Pat. Offices

The PATTIN split-type BOLT

The split-type bolt is one of the first slotted bolts, and continues to be a favorite wherever split-type bolts are used. Many mines still prefer this type. The bolt is a full 1-inch in diameter, with cut threads and furnished with hex or square nuts and various size plates and wedges.

IN WESTERN STATES

Pattin expansion shells are available and serviced exclusively by Colorado Fuel and Iron Corporation, Denver, Colorado. Western mining companies should contact them direct for information and consultation.

PATTIN

MANUFACTURING COMPANY
MARIETTA, OHIO

The PIONEER of roof bolting . . . established 1888

Don't Worry About It Smedley,
I Ordered Kelly Repair Parts.

KELLY MANUFACTURING CO.

MACHINE PARTS DIVISION
CHARLESTON 21, W. VA.

STEEL FABRICATING DIVISION
MIDDLEPORT, OHIO

WHAT YOU DON'T KNOW HURTS!

Most key mining officials read COAL AGE because it helps them do a better job.

If you're not a regular subscriber, Mail this coupon TODAY

COAL AGE, Fulfillment Manager,
330 West 42nd St., New York 36, N. Y.

Send me COAL AGE for 1 year at $3 (U.S. and Canada only).

☐ Check enclosed ☐ Bill Company ☐ Bill me

Name ..... Position .....

Mailing Address: ☐ Home ☐ Business

.....

.....

City ..... Zone ..... State .....

Mining Company .....

Hdqs. or Mine Name .....

CA5512

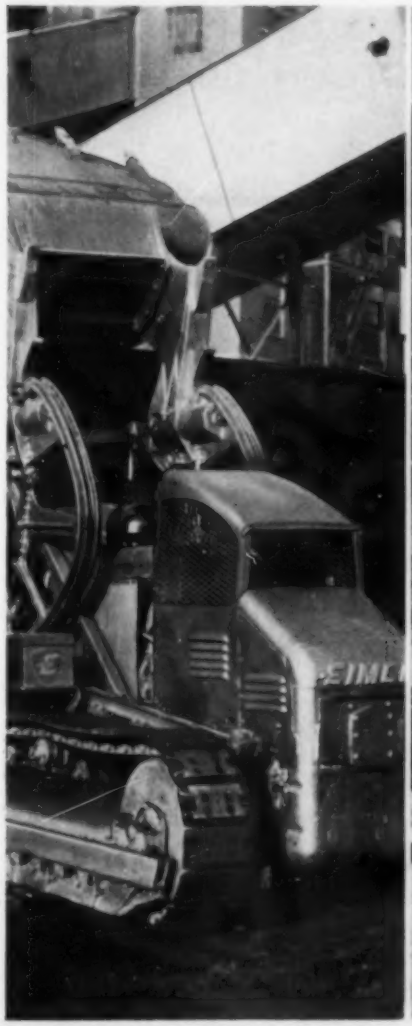
To Save Delay, Please Fill Out Completely

PROFIT NEWS FOR POWER USERS IN THE

all purpose power line

(20 TO 1650 H.P. IN ONLY 3 CYLINDER SIZES)

Now you can enjoy all the benefits of GM Diesel standardization in every type of equipment and still buy the best makes of equipment on the market



GM Diesel engines are offered in more than 1800 applications of power equipment built by over 250 leading manufacturers—wider availability than any other Diesel.

Only by standardizing on GM Diesel will a user get *all* the benefits of engine standardization—for *only* GM Diesel covers the entire power range with only 3 cylinder sizes.

Widest parts interchangeability pays off for operators in lower parts inventory requirements—many parts for a 33 H.P. "Jimmy" Diesel fit a 1650 H.P. "Jimmy."

GM DIESEL

PARTS AND SERVICE WORLDWIDE

DETROIT DIESEL ENGINE DIVISION, GENERAL MOTORS, DETROIT 28, MICH.

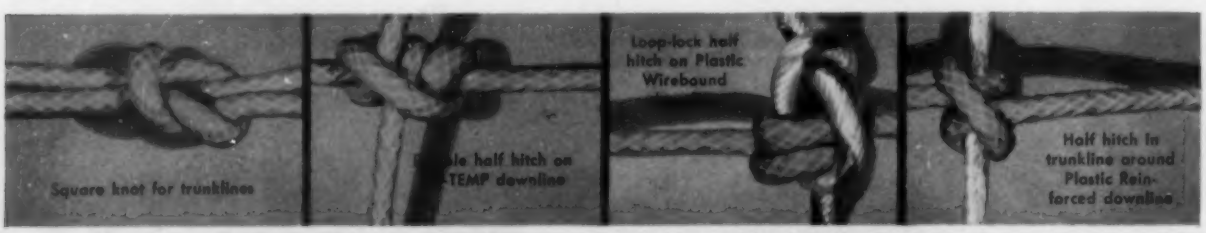
In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario

For an old-fashioned winter — this new-fashioned Primacord

You can get tight knots and hook-ups even with stiff fingers when the weather's *cold!* Ensign-Bickford's new LO-TEMP Primacord is very flexible, easy to handle, and knots securely at *all* temperatures — even down to *minus* 40°F.!

LO-TEMP can be used for in-hole priming wherever conditions do *not* call for our more rugged types of Primacord. Use it as the trunkline for *all* hook-ups. Detonate with fuse and cap or electric blasting cap, side-taped about eight inches in from the end of the trunkline, and with the business end of the cap pointing in the direction of the blast.

Like all types of Primacord, LO-TEMP is very insensitive to initiation by shock, friction, sparks or electricity. When initiated with a blasting cap, it explodes at a velocity of 21,000 feet per second and has the initiating energy of a blasting cap along its entire length.


Square knot for trunklines
Loop-lock half hitch on Plastic Wirebound
Half hitch in trunkline around Plastic Reinforced downline

For connecting trunklines and downlines

THE ENSIGN-BICKFORD COMPANY

Simsbury, Connecticut – Since 1836

L-2

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

COAL AGE

DECEMBER, 1959

IVAN A. GIVEN, EDITOR

Ultimate End

THE INHERENT WEAKNESS of "collective bargaining," the highly touted—in certain circles—"answer" to employer-employee collisions has been shown up more vividly than ever in the 1959 steel strike, whose aftereffects will linger for months if not years. Adding "collective" to the word "bargaining" does not endow the combination with any magic qualities. Consequently, when the adamant proprietor of a union monopoly faces an unyielding employer group, the result is anything but bargaining—likewise the final settlement, which is not a "bargain" reached after a fair sifting of the facts and a reasonable resolution of the issues but rather a surrender in whole or in part by the loser of the battle because of inability to continue.

Whatever the pious practitioners in the field of contract negotiation may say, that is the fact of the matter as things stand today. There can be no change until there is a change in attitude all along the line or the laws applying to the problem are revised. The possibilities of a change in attitude are, bluntly, rather remote, while revisions of the law are likely to be minor and made slowly and reluctantly. But they will be made if the economic damage continues to grow as a result of more and bigger battles. A ban on strikes and compulsory arbitration and adjudications by a federal tribunal could be among the ultimate steps.

Mining Too

WHEN RESEARCH is mentioned the coal hearer is likely to think almost automatically of investigation of the nature of coal and how to use it, including the design of burning equipment. Of late, also, market research is becoming a more-familiar term as the volume of such research grows. Research into improved mining systems and equipment still, however, tends to wind up at the end of the line in the thinking of the average coal man, even though it is unwise to take anything for granted these days, whether it is a spanking new machine or a method developed over many years of trial-and-error experience in the mine or plant.

Happily, the situation is changing for the better here as in other lines of research benefiting coal. And as it changes it will be seen that a wide list of opportunities for improvement exists—better front ends on shovels, a heading layout for better pressure resistance underground, and better materials for wear and corrosion resistance, to mention but a few. Because something has been bought in a certain form or has been done in a certain way and results seemingly have been good is no indication that major improvements cannot be achieved simply by a careful study of the machine, the method, the material, or what have you. Such research is one of the surest guarantees of maintaining coal's favorable position, and thus increasing its competitive power, in the years ahead.

IN SEPTEMBER, F. T. Bacon demonstrated Bacon cell—promising for specialized use in electric power plants.

IN OCTOBER, Allis-Chalmers Mfg. Co. demonstrated cell-driven tractor—first commercial model vehicle so-powered.

Fuel Cell Prospects and Coal

The fuel-cell battery for converting chemical energy directly into work-power has been a lab curiosity for 120 yr. Now, a firm upsurge of military and commercial interest is pushing it to take over many jobs done by today's heat engines and storage batteries.

By W. A. Raleigh Jr.
Associate Editor, *Coal Age*

COMMERCIAL POSSIBILITIES of the fuel cell are ripening. The fact raises these questions for coal:

1. What are the prospects for competition from fuel-cell use in generating central-station power?

2. What are the prospects for use of coal as fuel in the fuel cell, either as coal, coke or in converted-to-gas form?

Answers to both questions take the same broad line of departure—chances are slim during the immediate future, or within 5 to 10 yr.

Attempts to construct cells which would use coal or coke directly have failed to bring satisfactory results, and no low-cost process for converting coal to hydrogen and other gaseous derivatives is yet in the picture.

To generate primary central-station power, where large quantities of cheap hydrocarbons would be needed, the high-temperature cell is the logical choice. Formidable economic and technical problems remain, and incentives for large-scale research investment to solve them is presently lacking. On the basis of potential efficiency advantages alone, however, its long-range prospects for replacing or supplementing conventional or nuclear power sources cannot be ruled out.

Nearer to possible use in electric power plants, although still requiring much research, is the medium-temperature Bacon cell (above). It would be used to store off-peak energy for peaking service. Utilities might gain directly by solving the perennial problem of balancing power loads. Indirectly, suppliers serving steam plants based on coal, oil or gas might benefit from a better spread of fuel costs.

At the same time, an auxiliary system for large-scale storage of electricity could aid the cause of cheap nuclear power. Such a system might permit continuous operation of nuclear power plants and thus fill a major need to write off their high capital cost.

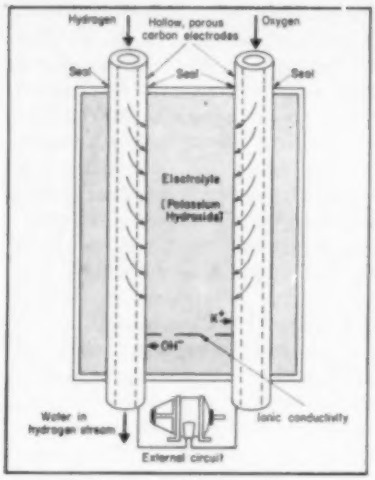
Although the fuel cell is not likely to have appreciable impact on coal during the next 5 to 10 yr, its ultimate potentials beyond 1970 should not be taken lightly.

Fuel-cell produced power was first demonstrated in the laboratory by a Britisher, Sir William Grove, in 1839. Since then development has blown hot and cold without promising results. But a firm upsurge of military and commercial interest, based on constantly improving design concepts and better materials of construction, leaves little doubt that the cell is no longer a laboratory curiosity.

The first practical application, to power a portable radar set for the Army Signal Corps (see accompanying panel), is already a matter of record; other military uses are due to follow within the next year or two.

A growing number of U. S. companies (p 77), working with the military, are also seeking commercial uses which may hit the markets within 5 yr. One example, the Allis-Chalmers fuel-cell driven tractor, demonstrated in October, is shown above.

New levels of efficiency in extracting energy from fuels, and designs which permit a wide range of sizes



A Basic-Type Cell: Operation and First U. S. Application

OPERATION AND CONSTRUCTION of a basic-type fuel cell, developed by the National Carbon Co., Div., Union Carbide Corp., is shown in the diagram. Hydrogen and oxygen gases enter the cell through specially-treated, hollow porous carbon electrodes. The gases diffuse to the surface where they come into contact with the electrolyte, a solution of potassium hydroxide. At the hydrogen electrode, the electrochemical reaction releases an electron, which flows through the external circuit and is accepted at the oxygen electrode. This flow of electrons is the current that powers electrical equipment. Ionic conductivity through the eletrolyte completes the circuit, and the water formed in the reaction passes from the cell in the hydrogen stream.

FIRST SIGNIFICANT APPLICATION of the cell described in the adjoining column came in the U. S. Army Signal Corp.'s "Silent Sentry," a lightweight, mobile radar set capable of spotting a single enemy a half-mile away in total darkness. The set, demonstrated in September, 1957, at the U. S. Army Electronic Proving Ground, Fort Huachuca, Ariz., incorporates a battery of fuel cells which silently provide power at 28 V. Success of the "Silent Sentry" is expected to lead to important commercial uses. "For the immediate present" National Carbon's Dr. Karl Kordesch says, "fuel cell applications will probably be restricted to those in which excellency of fuel efficiency, silence, freedom from fumes, simplicity of design and operation are important requirements."

and power output, will give the fuel cell many opportunities to replace heat engines as the source of vehicular motive power.

Because of longer life, the fuel cell may take over numerous jobs now done by conventional storage batteries.

Accelerated fuel-cell progress is almost certain to accompany vigorous military and commercial interest now well underway. Progressive, research-minded companies will keep close watch on this progress, allowing in particular for the possibility of "major breakthroughs" in fuel-cell technology. These could advance the day of putting competitive problems or consumption opportunities at coal's front door.

Fuel Cell: The Basic Story

The fuel cell is a battery which converts the chemical energy of fuels directly into electricity, i.e., without the intermediate step of combustion. The accompanying panel shows how this feat is done in the low-temperature, hydrogen-oxygen cell of the National Carbon Co., Div., Union Carbide Corp.—a basic type and the first to find practical application in the U. S.

By eliminating the combustion step, the fuel cell delivers useful workpower without heat, noise or smoke. The power is delivered at much higher efficiency than is possible with other energy-converting systems in use today. Theoretically, the fuel cell is capable of nearing 100% efficiency; in demonstration models, efficiencies range from 65 to 80%. By comparison, for example, the internal combustion engine nears, or has reached, peak efficiency at 25 to 30%, the diesel engine at 40%, and central-station steam generating turbines at 35 to 40%.

Compared to conventional batteries, the fuel cell has longer life. Theoretically, its operating life is indefinite since energy produced depends on an outside fuel supply and not on internal chemical elements which deteriorate or are consumed.

Fuel-cell design concepts provide for wide variations in size and power output. National Carbon figures the best design for its low-temperature, hydrogen-oxygen cell will probably produce 1 kw of power from a packaged unit 1 cu ft in volume. But the company adds:

"The voltage across the electrodes of the new fuel cell is approximately 1 V, and it is simply a matter of connecting a number of cells in a circuit to get any voltage desired. The amount of electrical current produced by the cell depends on its physical size, so by varying the number and size of cells, many combinations of voltages and currents can be obtained."

Where higher power output from the hydrogen-oxygen cell is desired, another approach is to operate it at higher pressures and temperatures.

Most promising of the medium-temperature type is the Hydrox or Bacon cell invented by F. T. Bacon, Cambridge, England. In September at the American Chemical Society's convention, Atlantic City, N. J., the inventor demonstrated a 40-cell Hydrox unit which operates at 200 to 400 psi and at about 400 F. (By

comparison, National Carbon's low-temperature cell has a normal operating temperature of 120 to 140 F and runs at atmospheric pressure.)

The demonstration unit, measuring 30x15x12-in, had a rated power output of 5 kw. Newer versions, scaling power output up to 10 kw, are reported already under full-scale development in both the U. S. and Great Britain. The Bacon cell is a leading contender for specialized use in electric power plants.

Where massive, economical production of electricity is visualized, as in primary central-station power, the fuel cell must operate at atmospheric pressure but in the high-temperature range, from 930 to 1,650 F. This temperature range is necessary to extract hydrogen or mixtures of hydrogen and carbon monoxide from such cheap fuels as natural gas, vaporized gasoline and coal.

The high-temperature cell also requires a molten-salt or carbonate electrolyte since aqueous electrolytes used in low- and medium-temperature cells would "burn up" or evaporate at high temperatures.

In view of possible fuel-cell use in generating central-station power and possible use of coal or derivatives as fuel sources, prospects for both are of immediate interest.

Coal and the Fuel Cell

Chances for coal use in the fuel cell are now slim and for this main reason: There is still no cheap way to make hydrogen from coal. L. G. Austin, heading up the fuel cell program at Pennsylvania State University, pinpoints the overall outlook as follows:

"Attempts to construct cells that would operate directly on coke or coal, the cheapest of fuels, have been disappointing. Far more promising is the mixture of hydrogen, carbon monoxide and hydrocarbons that can be made from coal. With suitable equipment to remove tar and grit, it could be piped directly from the gasification plant and used hot. However, a really low-cost process for generating gas from coal has yet to be devised."

In spite of the cloudy future for coal use in the fuel cell, the coal industry does have a definite stake in its development as a source of central-station power.

The British-developed Hydrox (hydrogen-oxygen) cell has reached the practical stage and "may provide a means to store off-peak energy for peaking service," *Electrical World*, a McGraw-Hill publication, states. If EW's prediction materializes, utilities might solve the perennial problem of balancing power loads. A better spread of fuel costs could strengthen coal's competitive position with coal-based steam plants. Appraising the possibilities of the Hydrox cell in more detail, the magazine says:

"For the power industry, the cell may ultimately provide an economic method of utilizing off-peak power. During the night, excess energy could be rectified and used to electrolyze water into hydrogen and oxygen gas. The gases would then be stored until peak hours, when they would be fed into batteries of Bacon cells, producing DC power. After conversion to AC, this power could be used for peaking."

Although the cell has reached the practical stage, EW adds, "much further development is needed, both to reduce the size and weight of the control unit and to investigate more fully the effects of impurities in the gases. Because of the high costs of automating the cell, it appears that units smaller than 100-w would be uneconomic."

On the minus side of coal's stake, an auxiliary fuel-cell system for large-scale storage of electricity could similarly benefit steam plants based on oil or gas; it could also aid the cause of expediting economic nuclear power. The high cost of nuclear power today is due more to the high cost of plant investment than to the cost of nuclear fuel itself. A storage facility would enable nuclear plants to operate at or near peak capacity, thus contributing importantly to writing off high plant costs.

For reasons explained previously, the high-temperature fuel cell is the logical choice for generating primary or large-scale central station power. To get a first-hand evaluation of prospects here, *Coal Age* interviewed Consolidation Coal Co.'s Dr. Everett Gorin, one of the country's leading authorities on the subject. Dr. Gorin's comments, in substance, add up as follows:

The high-temperature cell is still much in the laboratory stage. It is not likely to have any impact on coal competitively, or consumption-wise, for at least the next 5 yr. Further development of the cell would initially require an intensive research effort, say at a cost of $500,000 a year for 5 yr. No such effort is known to exist now. Neither military nor commercial concerns are "sufficiently sanguine" yet about possible applications to put out necessary funds. Even if a 5-yr program were decided upon today, total development should be considered a 10-yr project.

The initial focus of research effort should aim at assessing possibilities. Scientists must develop strong convictions that the high-temperature cell can be practical. At the present stage of development, the cell has not shown sufficient life or good performance. Needed in particular are better cell components and improved techniques for their assembly.

Technical problems are compounded by economic ones. High-temperature fuel-cell technology is based on use of a wide range of cheap hydrocarbon fuels. This is theoretically a great advantage. But converting these fuels to usable form is generally too complex and expensive for commercial consideration. Converting some liquid fuels, like kerosene, might be easier and less costly than gasifying coal which is mentioned most frequently.

Adding up the technical and economic problems gives a picture which is not yet encouraging to large-scale research investment. Millions of dollars could be spent or authorized, and the end result might well be costs for cell power which are not better than those of conventional power. And nuclear power already has a big headstart in research and investment to supply needs of high-cost fuel areas.

Although investment incentives are lacking at present, the high-temperature cell, as a primary source of central station power, has a definite potential advantage, efficiency-wise. On this basis alone, its ultimate prospects for replacing or supplementing conventional or nuclear sources cannot be ruled out. Because of the magnitude of investment and technical and economic problems involved, however, a full-scale research program, when undertaken, would be more appropriately set up as a combined effort of electric utilities, coal and other related interests.

Other leading authorities apparently concur in broad terms with Dr. Gorin's views on the depth and breadth of research needed on the high-temperature cell.

For example, F. T. Bacon, Cambridge, England, and inventor of the hydrogen-oxygen cell, says:

The fuel cell for generating large-scale power, using hydrogen from coal by ordinary chemical methods and oxygen from the air, is a "very ambitious project and cannot be honestly envisaged at present owing to the high cost of pure hydrogen produced this way; pure oxygen is also expensive."

Herman A. Liebhafsky and David L. Douglas of General Electric's Research Laboratory, Schenectady, N. Y., sum up the situation this way:

"Cells for special application will use hydrogen and should be ready for use within 5 yr. Any cells for the generation of electricity on a central-station scale would probably use gases containing carbon compounds as fuel. Although recent progress on such fuels is gratifying, the problems they present are so formidable and the requirements they must meet are so exacting, that it seems unwise to predict when they might be commercially successful."

Worth noting is this provocative slant on the first likely commercial use of large-scale power, as suggested by Penn State's L. G. Austin:

"If the performance of high-temperature fuel cells can be substantially improved, large-scale electric power might be generated near sources of cheap natural gas. The power produced, of course, would be in the form of direct rather than alternating current, and though high-voltage direct current is somewhat easier to transmit than alternating current, fuel cells apparently cannot produce high voltages. Large numbers of cells must be connected in series, and above 700 V there is electrical leakage through the insulation separating the terminals.

"Large-scale power from fuel cells should, therefore, find its first application in electrochemical processes such as the production of aluminum, which utilize large quantities of direct current at low voltage. Electrochemical industries may then congregate near natural-gas sources as they now cluster around hydroelectric installations."

Smart Approach: Allow For the "Breakthrough"

By and large, the fuel cell gives coal little apparent cause for immediate concern. Competitively, coal's stake is tied up primarily with prospects of solving formidable economic and technical problems involved in use of the high-temperature cell as a source of primary central-station power; consumption-wise, with the still-unsolved and perhaps equally formidable economic problem of developing a low-cost process for making hydrogen and other gases from coal. In terms of what is known today, none of these problems is likely to be solved for at least 5 yr and probably not for 10 yr.

In modern research and technology, however, crystal-ball forecasting is always dangerous. One must always allow for the possibility of a "major breakthrough" upsetting predicted development schedules.

A strong military interest undergirds this possibility. The military already takes credit for the first practical application of the fuel cell in the Signal Corps' "Silent Sentry" radar set noted on p 75. Next year, analysts are predicting the Navy will have some new use based on the higher-power 10-kw Bacon cell unit.

Other military projects are no doubt underway. In a 119-page progress report on fuel cell studies, Dr. B. R. Stein, Army research authority, reports the Army "has considerable interest in the development of fuel cells to power its equipment, which would free it from the logistics problem of providing large quantities of fuels for conventional engines. Also, fuel cells would be difficult of detection by the enemy, since there is no noise, excessive heat, or other 'detectable' quality."

From military experience and achievement, informed observers look for a spill-over of benefits to expedite commercial fuel-cell uses. Similarly, space programs on hydrogen development might aid the cause by speeding up the technology of making this fuel available at lower cost.

While the military is appropriately taking the lead on fuel-cell applications, commercial interest is moving fast and is not far behind. Several authorities note one sure sign: An increasing concern over patent protection and the concomitant decline of technical literature on the subject. Other signs are also showing up.

A growing number of U. S. companies are hopping on the bandwagon of research and development. Active, or frequently mentioned in research circles, are such well-known firms as the following:

Consolidation Coal Co.
Mine Safety Appliances Co.
Electric Storage Battery Co.
General Electric Co.
Westinghouse Electric Corp.
Allis-Chalmers Manufacturing Co.
National Carbon Co., Div., Union Carbide Corp.
Dow Chemical Co.
Leesona Corp. (formerly Universal Winding Co.)
Aerojet General Corp.
Radio Corp. of America
Standard Oil of New Jersey
Curtiss-Wright Corp.
Lockheed Aircraft Corp.
United Aircraft Corp.
Chrysler Corp.

Worth noting, too, McGraw-Hill publications have seldom given such widespread treatment to the same subject within a few months. Significant in itself is the common commercial tone struck by titles of the following articles appearing in 1959:

"Profit Potential Sparks Fuel Cell Scramble" (*Chemical Week*, July 25).

"Fuel Cells Nearer Market" (*Business Week*, September 19).

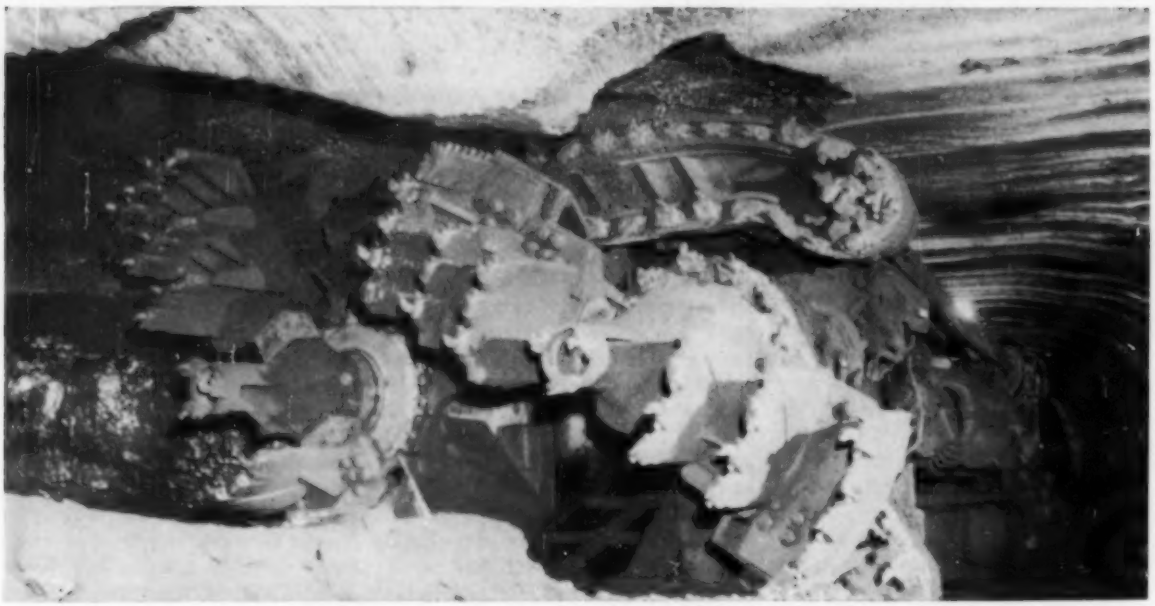
"Fuel Cell Reaches Practical Stage" (*Electrical World*, September 21).

"Fuel Cells Will Be on the Market Soon" (*Petroleum Week*, September 25).

The upsurge in military and commercial interest is a near-sure bet to accelerate fuel cell progress. Whether this progress will speed up technology on use of the high-temperature cell for generating primary central-station power, or on cheaper processes for gasifying coal are matters for conjecture. To prepare for either or both of these eventualities, however, coal should:

1. Keep close tabs on the fuel-cell research and development.

2. Bear a close eye for opportunities to participate in cooperative research with electric utilities, equipment manufacturers and related interests.



TWIN-HEAD BORING-TYPE MINERS are the production mainstay at Loveridge. One unit has produced as high as 760 tons.

Mining at Loveridge

Development—Belt slope, full retreat, 8-heading intakes and returns

Face Production—Twin-head borers, pickup loaders, shuttle cars, AC power

Ventilation—Diffusers on miners supplemented by dual exhausters, demountable steel stoppings, no haulage through curtains or doors

Transportation—Extensible and ropeframe belts, automatic loading stations, 20-ton cars, 50-ton locomotives

RESEARCH to develop the best in methods and scientific selection of manpower reinforce modern mining equipment at the new Loveridge mine of the Mountaineer Coal Co., Fairview, W. Va., to insure that present production per man, already outstanding, will be steadily increased in the future as the property enters the room-and-pillar phase of its 30-yr life and works up to its rated output of 15,000 tons of clean coal per day of three operating shifts.

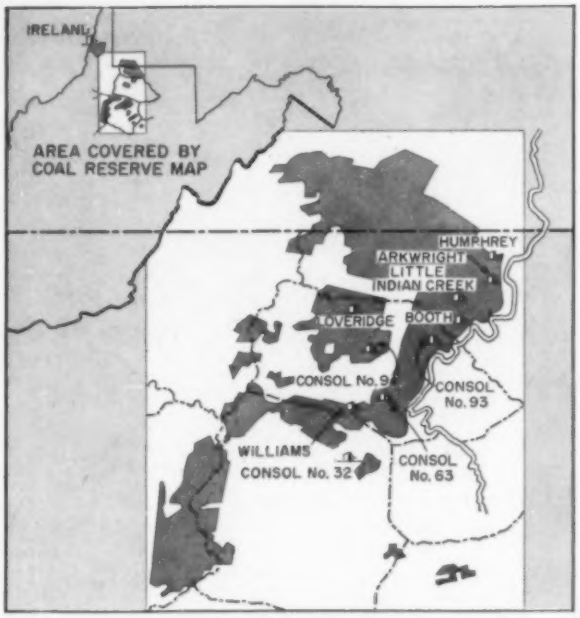
Production comes from boring-type continuous miners supplemented by shuttle-car, belt and mine-car haulage, plus belt hoisting. On the surface the coal is prepared for market by washing in jigs and tables and heat drying, plus screening, crushing and other operations (see p 92 of this issue).

Research is represented in Loveridge development and operation by such things as an entry layout designed to stand up better under overburden pressures over the years, and a ventilating system based on a thorough investigation of how, where, at what time and in what quantity methane is released. The scientific approach to staffing is reflected in the fact that all hourly men are given aptitude tests, though selection is based primarily on proven ability and attitude. In addition to aptitude tests prospective production supervisors are given personality tests. Consequently, Loveridge productivity benefits from having a young, alert, knowledgeable and trainable group of employees, all with a predilection for mechanized mining and preparation and the physical skills to go with it. The testing program is under the supervision of John T. Evans, supervisor of employee relations.

Coal Source

Loveridge production comes from the Pittsburgh seam, one of the biggest single mineral resources of the United States, if not the world. Average thickness is 8 ft, of which 7 ft is taken by the boring-type miners, leaving 1 ft against the drawslate top and characteristic rider. Average dip is 1½% northwest. Minimum cover is approximately 50 ft at the eastern end of the property, running up to 1,400 ft at the west.

The weight of the burden even at the eastern end where development was started is sufficient to drive pillars down into the fireclay floor in some



MINE AND PLANT LOCATIONS and coal reserves, Consol in northern West Virginia. Excluding Ireland, total reserves are 1 billion 300 million tons. Reserves of the new Loveridge mine are approximately 90 million.

Consol in Northern W. Virginia

The opening of Loveridge mine in March, 1958, brought up to 12 and 10, respectively, the number of mines and preparation plants operated by Consolidation Coal Co., in northern West Virginia, in addition to properties in Ohio, Pennsylvania, Tennessee, Virginia and West Virginia. The northern West Virginia properties, accounting for about 35% of Consol's production, are:

Ireland mine and preparation plant, Hanna Coal Co., Moundsville, W. Va.—Pittsburgh seam, belt slope, 20,000 tons daily capacity, steam coal directly to the Kammer station operated by the American Electric Power Co.

Arkwright plant, Christopher Coal Co., Granville, W. Va.—Prepares coal from Arkwright No. 1 and Osage No. 3 mines, Pittsburgh seam, each 8,000 tpd; loading to Monongahela Ry., Monongahela River and trucks; utility, industrial, commercial and domestic markets.

Humphrey plant, Christopher Coal Co., Maidsville, W. Va.—Prepares coal from Humphrey No. 7, 10,000 tpd capacity, and Pursglove No. 15, 8,000 tpd; Monongahela Ry. and River; by-product, metallurgical and utility markets.

Booth No. 6, Christopher Coal Co., Edna, W. Va.—Pittsburgh seam, 2,200 tpd capacity; Monongahela R. R. and River; by-product, metallurgical, steam, commercial, domestic.

Consol No. 9 mine and preparation plant, Mountaineer Coal Co., Farmington, W. Va.; acquired by purchase from Jamison Coal & Coke Co. in October, 1954; Pittsburgh seam, belt slope, 10,000 tpd capacity; Baltimore & Ohio R. R.; by-product, metallurgical, utility, general manufacturing, cement-burning, etc.

Consol No. 63, Mountaineer Coal Co., Monongahela, W. Va.—Pittsburgh seam, 2,000 tpd capacity; Baltimore & Ohio Ry.; industrial, utility, commercial and domestic markets.

Consol No. 93, Mountaineer Coal Co., Jordan, W. Va.—Pittsburgh seam, 4,500 tpd capacity; Monongahela Ry. and River; industrial, utility, commercial, domestic.

Williams mine and preparation plant, Mountaineer Coal Co., Stringer, W. Va.; Pittsburgh seam, belt slope; 7,500 tpd capacity; Western Maryland and Baltimore & Ohio; industrial, utility, commercial and domestic markets; first in northern West Virginia to install two types of washers (heavy medium and tables) with drying facilities for slack.

Loveridge mine and preparation plant, Mountaineer Coal Co., Fairview, W. Va.; initial development (man shaft, air shaft and part of belt slope) by Jamison as Jamison No. 22; Pittsburgh seam, virgin mining area, present reserves of approximately 90 million tons, or 30 yr at planned rate of 3 million per year; 15,000 tpd capacity; Monongahela Ry.; industrial, utility, commercial and domestic markets; named for George H. Love, chairman of the board, Consol.

Excluding Ireland in Marshall County reserves held by Consol in northern West Virginia total 1 billion 300 million tons in Wetzel, Monongalia, Marion, Doddridge, Harrison and Taylor counties, with present openings in Harrison, Marion and Monongalia.

Of the 10 million tons sold from northern West Virginia by Consol in 1958, 62% went to electric utilities. In the past 10 yr, through major expenditures for new plants and equipment and improved techniques, Consol has raised the average heat content of its output from 13,000 to 13,600 Btu per lb, in addition to other steps designed to promote convenience and economy in use.

spots and thus cause some heaving in crosscuts. Because 1 ft of coal is left and because the boring-type miners produce an arched roof span, support in entry development is considered necessary only at four-way intersections. Here it is provided by bolts.

Slope and Shafts

An area approximately 4 mi wide and 6 mi long is presently allocated to Loveridge. The preparation plant and main openings are approximately 1½ mi from the easterly end in Sugar Run valley. The site was selected by Jamison officials whose studies showed that it was about the only one that would provide the necessary surface area plus convenient surface access.

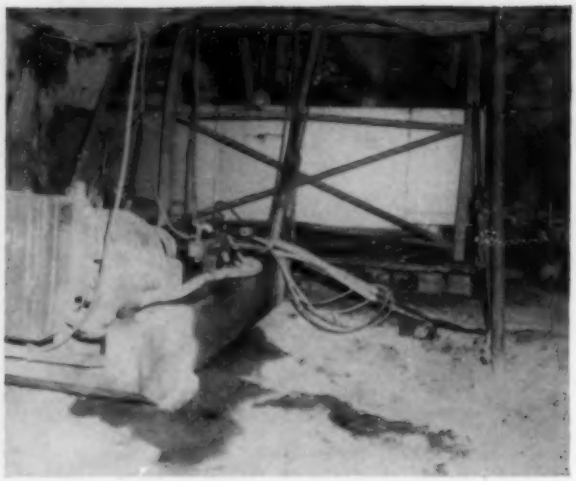
The position and direction of the belt slope were chosen to put the main bottom under a hill since, in Jamison's experience, the roof was better under thicker cover. Sinking of the belt slope was started by Jamison and completed by R. G. Johnson under contract with Mountaineer using conventional drilling, shooting and mucking methods. Details include the following:

Slope inclination—15 deg 9 min

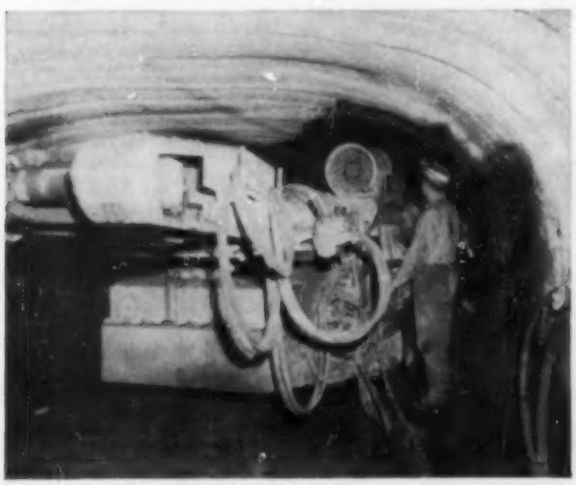
Size—12½ ft wide, 14 ft high

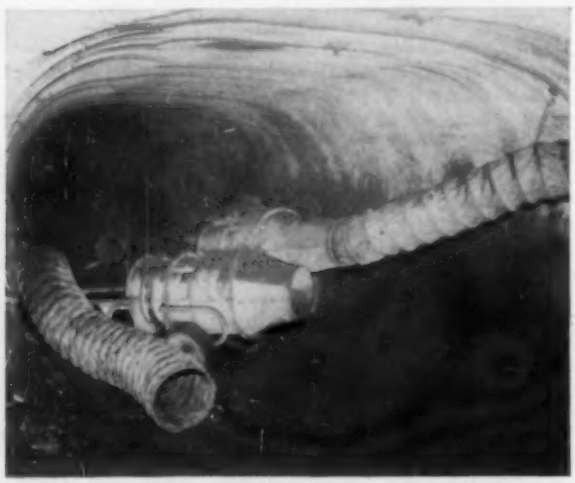
Length—2,646.8 ft coping to bottom of coal; 2,959.3 ft to bottom of dump pit.

PICKUP LOADER and single torque-converter shuttle car start Loveridge coal on its way to the surface.

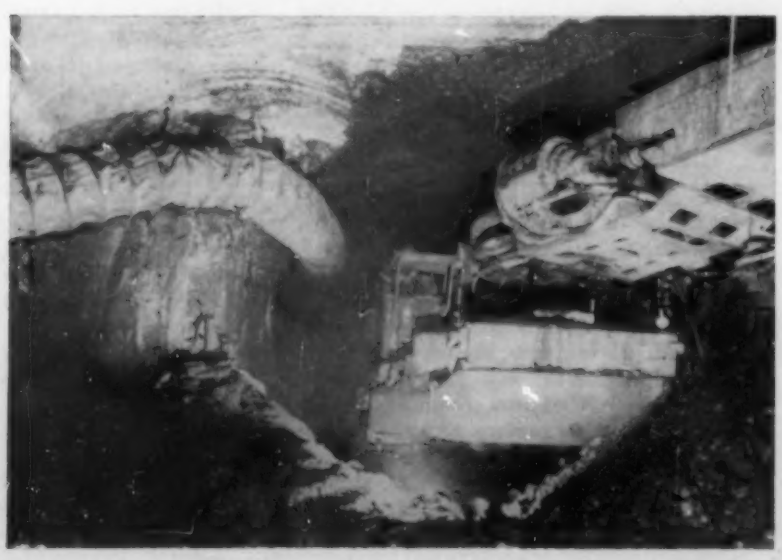


AUTOMATIC LOADING STATION handles last step of getting coal from face to mine car at Loveridge.



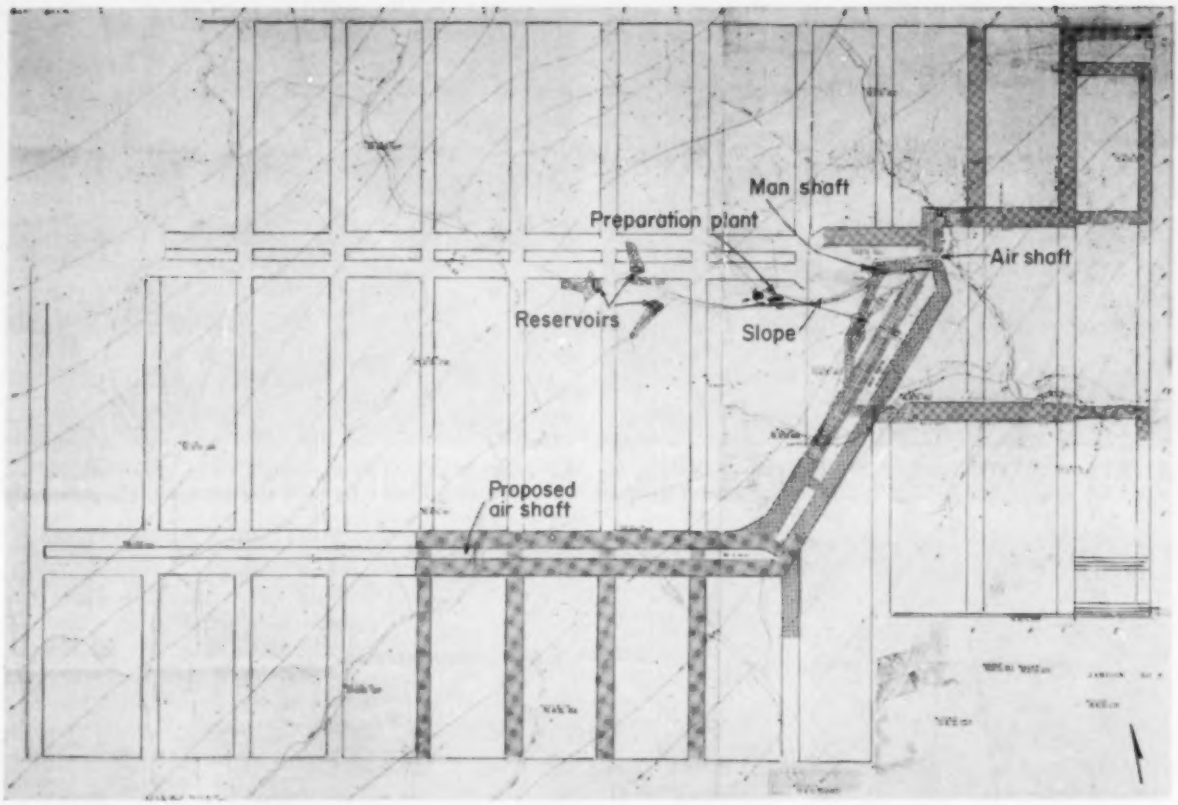


FACE VENTILATION facilities involve a diffuser on the machine (upper left) and dual exhaust fans (upper right). One of the two exhaust tubes is shown in place (below), with a second about to be added.



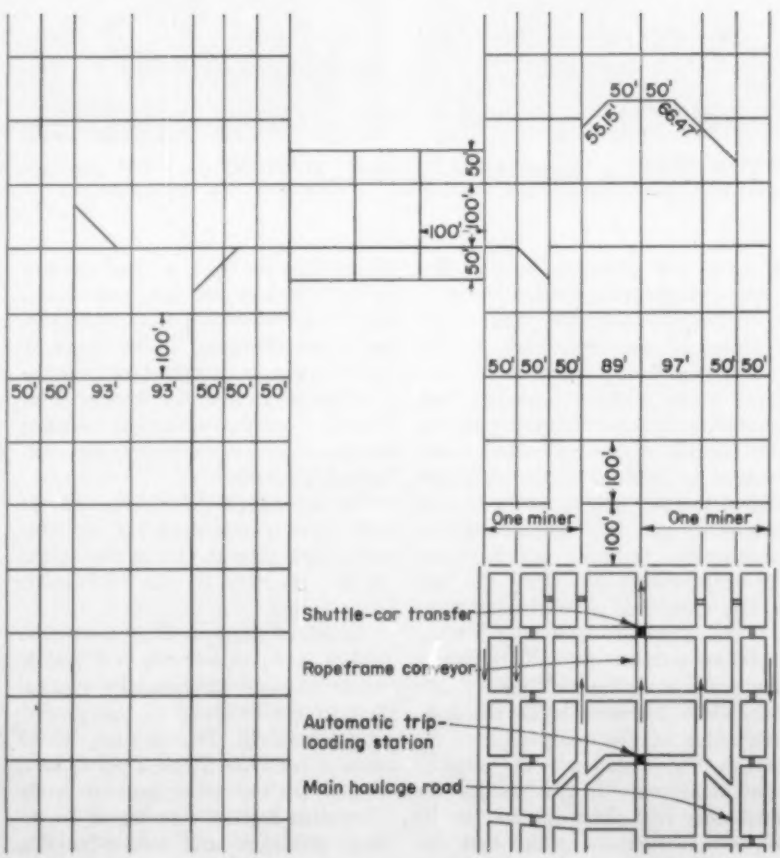
Lining—Concrete for 175 ft down from top and at the bottom; remainder, 2 in of Gunite on 4-in-square-mesh wire held by roof bolts

Belt Hoisting—The slope belt at Loveridge is in the upper half of the slope with the supply track underneath. Operating on a Fairmont Machinery structure and Hewitt-Robins idlers the 48-in-wide Goodyear Compass belt has a center-to-center length of 3,087 ft. It lifts the coal 807 ft, or the second highest for a belt in the industry, and with two 800-hp motors is tops in connected horsepower. Consequently, it is logical for it to be the most highly stressed belt —2,350 lb per inch of width—ever built. Other features of the belt include:



LOVERIDGE DEVELOPMENT is based on dual 8-heading main entry groups, and cross and panel entries for full retreat in final mining (500-ft scale map).

HEADING SETUP for main entries includes 300-ft barrier between the eight intakes and eight returns, as well as increased centers in the middle of each group for greater resistance to pressure. Ventilation setup during development permits shuttle-car haulage without passing through doors or curtains.



Seven rolls, field spliced.

36 tons of 3/16-in steel cable, or over 1 million ft.

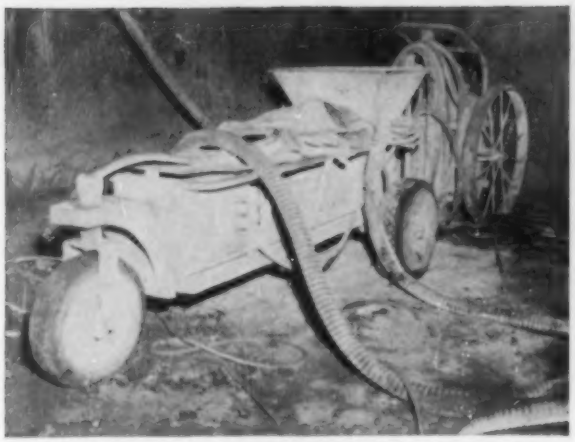
6 tons HDNF fabric.

70 tons crude-rubber compound.

Capacity—1,680 tph at a speed of 625 fpm.

The belt is driven by two 800-hp Westinghouse 1,180-rpm wound-rotor motors through Falk 36.6:1 14-DDF reducers.

Because of the total weights of belt and coal involved special attention was devoted to rollback prevention. Consequently dual post-type brakes, 10 ft in diameter with 18-in faces, were provided for automatic application. Each brake is capable of holding the belt with a full load—150 tons. Five mechanical and electrical



SAFETY AND COMFORT PROVISIONS in the section include fire extinguisher and dry rockduster for general dusting.

AC POWER SERVICE is provided through load centers receiving 4,160 V by cable and delivering 440 V.

WATER LINE has four-way outlet for sprinkling, wet dusting, belt wetting.

FIRE STATIONS every 200 ft receive water from 4-in aluminum line.

actuators are provided for the two brakes so that if any one actuator or brake should fail the others will function to prevent rollback.

The slope belt receives coal from a short 54-in pad or speedup belt under the 50-ton dump hopper on the bottom. A Stearns self-cleaining magnet is installed at the discharge end of the pad belt to remove tramp iron. The pad belt is preceded by preliminary feeding, scalping and crushing equipment.

The main belt is supplemented by a closed-circuit television setup (M-S-A) installed primarily to check the position of the rock gate in the headhouse. Monitors in the dispatcher's office at the dump and at the washer-control station in the preparation plant make it possible for the dispatcher and plant operator to observe the situation at the belt discharge. To run rock a clear space is left on the belt and then rock dumping is started. When the clear space goes over the head pulley the rock gate opens and this fact can be checked by either the dispatcher or washer operator—also its closing afterward, during a clear space following the rock.

Service Shafts—In addition to the belt slope, a man shaft and air shaft were sunk prior to Consol acquisition of the property by the Williamson organization.

Depth of the man shaft is 658.5 ft and it is equipped with a Westinghouse elevator mechanically equivalent to the elevators in the Empire State Building. The capacity is 28 men under West Virginia regulations, though the nameplate capacity is 46. The shaft is in the center of an office, bathhouse and service-building group which, among other facilities, includes a display room and other facilities for visitors. A model of the preparation plant, working models of many of the mining and preparation units, samples of various components, such as belts, mining diagrams, photos and murals, and information charts give the visitor some of the highlights of the Loveridge property.

The service group, in addition to visitors, also accommodates all mine officials and engineering and clerical personnel, as well as all surface and under ground employees, and includes automatic self-service charging facilities for the Wheat cap lamps employed. Eventual total employment will be approximately 600 on the three operating shifts.

Depth of the air shaft, a 13-ft circular unit, is 626 ft. It is equipped with dual 7-ft Joy Axivane fans each with a rated capacity of 250,000 cfm. In less than two years a second airshaft will be in operation a little over 3 mi (entry distance) west of the present shaft. Overall size will be 13 ft by 26 ft 8 in with an 8-in curtain wall to separate upcast from downcast compartments. It will be equipped with two 7-ft diameter fans operating in parallel with the original units. The shaft also will be equipped with a small gasoline-engine-powered emergency hoist. As development progresses beyond this second field shaft additional air and emergency openings will be made by big drills.

Development

Full retreat is the basic mining ap-

DEMOUNTABLE STOPPINGS separate intakes and returns in development of the mains at Loveridge.

LOVERIDGE MAIN LINE uses limestone ballast, creosoted ties and aluminum feeder and return paralleling 85-lb rail.

ELECTRIC THROWERS with indicating lights are provided for critical frequently-used switches.

SINGLE-CAR ROTARY DUMP discharges 20-ton cars on 45-sec cycle, automatically after dumping starts.

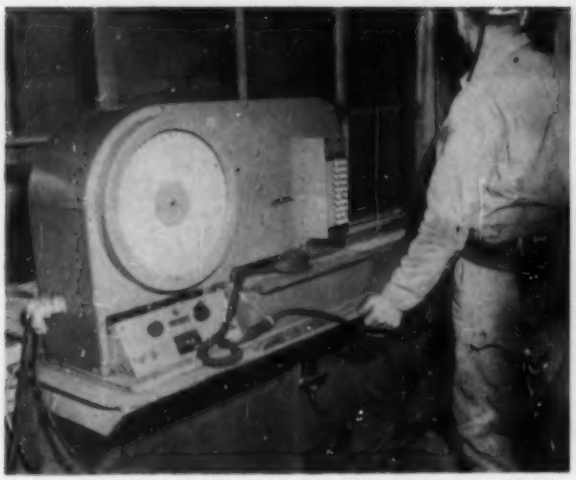
proach, and in preparation for that phase the mine is now in the entry-driving state. In the retreat state, operation will be based on shuttle cars to extensible belts to ropeframe belts to mine cars. Number of headings in cross, panel and other entries still is tentative and is not expected to be decided upon until some experience in actual room-and-pillar work is gained.

The mains now being driven consist of two groups of eight headings each. One group will serve as intakes and the other as returns. A barrier of 300 ft is left intact between each group except where cross entries are turned. Normally such entries are turned at 2,000-ft intervals, or what is considered a good practicable maximum for ropeframe conveyor installation and operation. Room panels will be turned off these cross entries at intervals of approximately 1,000 ft—again considered a good practicable maximum for extensible belts and shuttle cars. As previously noted, the number of headings in panel entries and also in cross is tentative. But whatever the number finally decided upon, extensible belts in rooms approximately 1,000 ft deep will deliver to ropeframe conveyors in 2,000-ft-long panel entries, and these conveyors in turn to cars in the cross entries.

The main-entry plan at Loveridge is shown in the accompanying drawing, with a second showing development to date. One feature of the entry plan is the increase in size of pillars in the center. This reflects the results of a study of the effects of overburden pressures. The increase in chain-pillar size compensates for the extra stress in the center of the "pressure arch" and thus gives the center headings the necessary added protection. The 300-ft barrier between the 8-heading sets provides the same benefits for the entire entry.

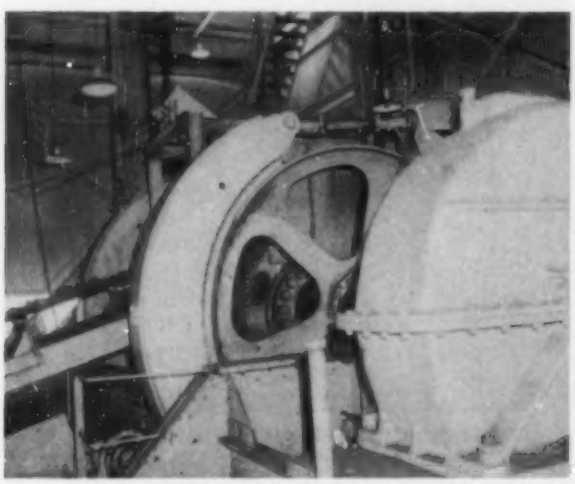
In driving the intake group of eight headings in development to date the air is brought up the center, using five headings, and returned through one heading on the outside and two on the inside. The ropeframe conveyor receiving coal from the shuttle car or cars feed to mine cars on the loop track. These loops are made at intervals of approximately 2,000 ft normally though some were closer in early development. Supply tracks are laid paralleling the belt.

This system, among other things, permits shuttle-car haulage without going through curtains or doors, as shown in the entry plan. With two mining units, both work from the

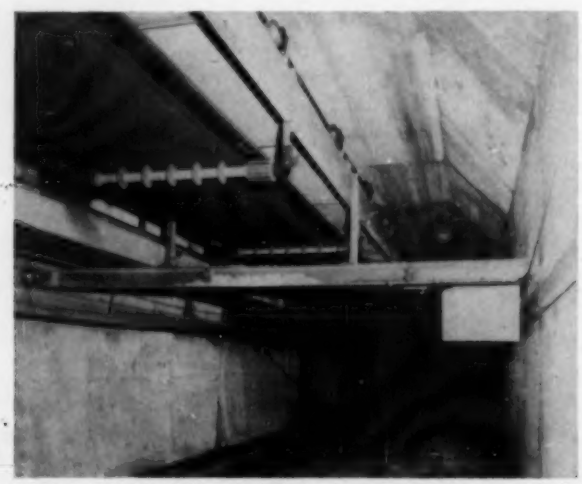


WEIGHT OF COAL in each car is automatically recorded by scales in dispatcher-dumper's office.

HOISTING AT LOVERIDGE is handled by 48-in steel-cord belt with a capacity of 1,680 tph at 625 fpm.



TWO 800-HP MOTORS in the headhouse supply power for the slope-belt drive equipment.



UPPER HALF of the 14-ft-high slope is for the main belt, with supply track on the bottom.

BURIED TANK (20,000 gal) in hill behind drum racks permits tank-car purchase of hydraulic oil.

SURFACE FACILITIES include office, bathhouse, elevator-equipped manshaft and circular airshaft with dual fans, each rated at 250,000 cfm.

ON THE JOB AT LOVERIDGE—Harry Turner (left), superintendent; Baldwin Jarrett, section foreman; John Bugelavics, Joy Mfg. Co., and Ralph Mick, general mine foreman.

sides to the center, usually alternating in removing the seventh, or odd, crosscut.

Mining Equipment

The basic mining unit at Loveridge will be, in the first room-and-pillar stage, as follows:

Two Joy Twinborers.

Two 11BU pickup loaders.

Two 7-ton NMS Torkars.

One Joy extensible belt for operation to a maximum distance of 1,000 ft in room advancement.

One Joy Limberope conveyor operating over a range of 2,000 ft in panel entries and feeding to mine cars.

One Stamler automatic mine-car loading station.

In entry development the extensible belt is eliminated in driving the intakes and only the Limberope is employed. In returns development two extensible belts are substituted for the ropeframe belt. All belting employed in the mine is neoprene, primarily Goodyear. All power cables also are neoprene.

Auxiliary equipment includes two 5-hp Jeffrey exhaust fans with each miner, plus a 1½-hp "diffuser" mounted on the miner at the operator's station. The exhausters pull air through Flexitube hung on spads placed with an American Mine Supply spad driver. Present tubing size is 14 in, but 16-in will be employed in the future, permitting a flow of 5,000 cfm, or 10,000 cfm total, at the maximum crosscut distance of 100 ft.

Mountaineer Management

President—George R. Higinbotham
Vice President—George L. Judy
Chief Engineer—H. L. Washburn
Mining Engineer—Ray M. Henderson
Construction Engineer—G. J. White
Planning Engineer—A. E. Belton
Maintenance Superintendent—C. S. Conrad
General Superintendent, No. 9 and Williams—K. K. Kincell
General Superintendent, No. 93 and Loveridge—John B. Kebblish

Loveridge Personnel

Superintendent—Harry Turner
General Mine Foreman—Ralph Mick
Assistant Mine Foremen—Joe Akers, Paul Hay, Willard Starcher
Preparation Engineer and Outside Maintenance Foreman—Glen Hamilton
Inside Maintenance Foreman—Delbert Gauer
Mining Engineer—Ralph Current

In operation the diffuser blows into the right-hand corner of the place, when operations are on the left side of the section, to provide turbulence and force to break up gas and such dust as is not killed by the water sprays. On the opposite side, the two tubing lines, kept up to a point opposite the operator, pull gas and dust out and exhaust it directly into the return. When operations are in the right side of the section the diffuser is mounted on the left side of the machine and the two tubing lines are on the opposite side. Among other benefits the dust is moved away from the operator rather than back over his position at the miner controls.

Air is directed to the last crosscut by means of Kennedy demountable steel stoppings calked with brattice.

Another step to reduce the gas load in driving the intakes, which are the pioneer openings, is drilling ahead to permit bleeding. As the miner completes a 100-ft advance in a heading a 2-in hole is drilled 100 ft ahead with an A-7 handheld drill. Holes are drilled on the rib and help materially in reducing the rate of emission during actual cutting. The intakes, being driven ahead of the returns, effectively bleed the coal in which the returns are driven. Consequently the gas problem becomes a minor one and advance boreholes are unnecessary.

Other auxiliary equipment in a section includes a 20-lb wheel-mounted portable fire extinguisher supplemented by 2-lb units on each machine, a slurry-type rockduster for keeping dust to within 40 ft of the face, an M-S-A Bantam dry duster for all other dusting work, Fletcher bolting equipment, two Chemox machines, two All-Service masks and 20 M-S-A self-rescuers.

The Twinborers make an opening 13 ft wide and 7 ft high, leaving, as previously noted, an average of 1 ft of coal in the top with rounded corners for an arch effect. Consequently, support is provided only at four-way intersections. This support consists of mine bolts placed with Fletcher equipment. Five bolts are first installed along the centerline of the place to be crossed. Then as the cross place is developed four more are placed, two on each side of the center one of the first row.

Crews and Production

The standard crew for a two-miner production unit is:

Two miner operators.

Two pickup loader operators.

Two shuttle-car drivers.

Two utility men—rockdusting, bolting, etc.

One mechanic.

One foreman.

Total, ten.

With six miners on hand at the time this feature was prepared, five were in regular service and one served as an "operating spare," being available for production as desired and also permitting necessary main-

tenance without reducing the scheduled production. In full operation the miners will total 15, of which two will be spares, one probably "operating" and the other in the shop or standing aside waiting for unit replacement. Incidentally, no major repair work is done at Loveridge. Unit and machine rebuilding is done in the central shop or in contract shops. Cable splicing also is contracted.

Best production by a two-miner unit to date has been 1,340 tons of raw coal per shift. Best production from a single machine has been 760 tons per shift.

Mine Haulage

Fifty-ton locomotives and 20-ton cars are the basis of main haulage at Loveridge. The 50-ton locomotives, made by G. E. and not yet all in service, have been christened for basketball and football greats—"Hot-Rod Hundley," "Hurry-Up Yost," and "Ronnie Renton Flash." They have a rated speed of 15 mph with 30 loaded cars, 3% adverse grade. Equipment includes air brakes, regenerative braking with battery energization, air-operated contactors, air sanding and powered pole retriever.

The Differential mine cars are 7 ft wide, 53 in high over the rail empty (52 in loaded) and are 28 ft long over the Willison automatic couplers. Features of the axleless trucks include 10-in wheels with Timken bearings and pressed-on steel tires. Bodies are Cor-Ten steel. At full capacity of 5,000 tons per shift a total of 325 cars will be employed.

High-speed operation with a minimum of derailments and maintenance were the goals in track and haulageway construction. Machine cut width establishes haulageway width of 13 ft. Height is adjusted to provide a clearance of 7½ ft over the rails. This is obtained by backing the miner up at intervals—usually 100 ft—and using it to cut the required additional depth down to the first underlying hard rock. Over 70% of the necessary bottom brushing is done in this fashion. The other 30% is taken by drilling and shooting.

Maximum grades will be maintained at not more than 3% against the loads, normally by taking bottom. Cuts of as much as 8 ft have been made to bring grades to the desired specification (2 ft by the miner and 6 ft by drilling and shooting). Depth graded by the miners has varied from 18 to 36 in.

Total brushing provides for 6 in of ballast under the 6x8 creosoted ties and 85-lb rail. Where life will be less than approximately 6 to 7 yr, 5x7 ties are used and are ballasted with ashes from the dryer-plant furnaces. Some 60-lb track on creosoted ties is used for empty haulage in the bottom area, and the same weight of rail with steel and wood ties will be employed in cross entries up to the belt heads.

Because of the length of cars and locomotives, minimum curve radius is 50 ft. To further reduce wear of wheel flanges an oiling station will be installed in the near future as a result of experience at other mines, such as No. 9, where oiling along with proper lubrication of wheel and center bearings, cut rebuilding from 40 to 50 wheels to 10 per month in spite of the fact that wheelbases differ as much as ¼ in from one side of the truck to the other.

Trip movement at Loveridge is controlled by a dispatcher and dumper (one man) at the foot of the slope. Facilities available to him include an M-S-A Minephone system. Cheatham electric switch throwers and indicators are installed at critical frequently used switches on the bottom and elsewhere.

Haulage power naturally is DC, with the present source a 500-kw Westinghouse ignitron rectifier. This unit will be supplemented by a Hockbridge & Hewittic glass-tube unit in the future, also 500 kw. Planned distance between rectifiers is 8,000 ft. The glass-tube unit will be the first to go underground in the U. S. Power for haulage is transmitted through Kaiser 1,600,000 cir mil feeder and No. 9-section trolley on combination Ohio Brass hangers with O-B section insulating switches.

This haulage system also powers the construction equipment employed underground, including a rubber-mounted cutter employed, among other things, for cutting refuge holes along the main haulageway.

The main rubber-covered cable for AC section power normally is carried on the same side of the haulage heading as the feeder and trolley. It is suspended on a messenger between the trolley and the rib.

A firefighting, sprinkling and water-service line is suspended from the roof on the side of the haulage heading opposite the wire. It is constructed of 4-in Schedule 10 Alcoa aluminum tubing purchased in lengths of 30 ft with grooves already rolled for Victaulic couplings. One-man installation and extension is a major advantage, reflecting its lightness. The line is extended to within two or three crosscuts of the working faces, at which point a four-way fixture serves hose lines to the miners and the wet rockduster, with the fourth outlet for a modest drip to keep the section belt moist.

Firefighting stations are inserted in the water line at 200-ft intervals throughout its length. In addition to the necessary connection, each station includes a 100-ft coil for hose hung on the rib, or enough to reach halfway to either adjacent station.

Fresh water for all uses comes from three ponds on the surface with a total capacity of 103 million gal. If desired, the water service lines can be fed with mine water in the future and can be used also, if necessary, for pump discharge.

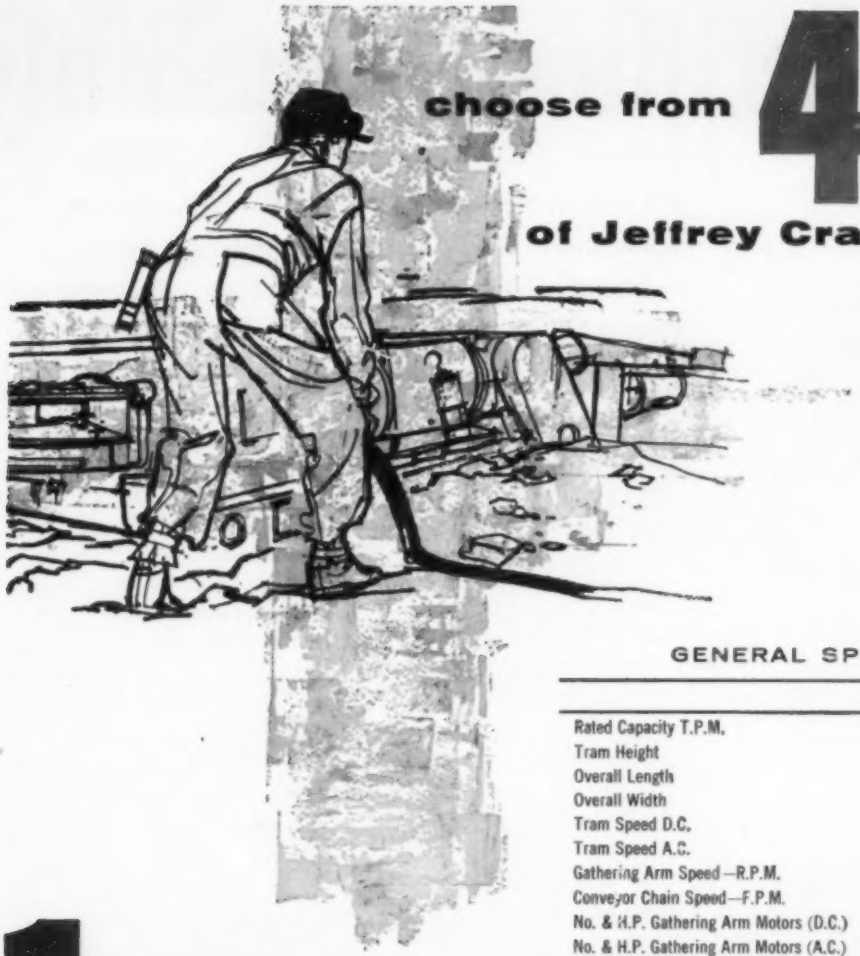
Dumping at the bottom is handled by a Nolan rotary unit with supplemental trip-feeding equipment. Cars are dumped one at a time without uncoupling, and feeding and dumping on a 45-sec cycle is done automatically, as is weighing and recording with Fairbanks Morse equipment, once the dumping switch is closed.

AC Operation

Aside from DC for haulage and construction, as previoulsy outlined, all operations in Loveridge are powered by 440-V AC. G. E. load centers in each section serve all units. These load centers also include the necessary transformer equipment as well as starting and circuit-protective devices. Power is furnished to the load centers by 4,160-V rubber-covered cables suspended, as previously outlined, in the haulage openings. The main power source is a company-owned substation on the surface with a capacity of 15,750 kva. Employing Westinghouse transformers it also includes lightning protection and capacitors for power-factor improvement. The cable circuit is taken into the workings through boreholes.

Loveridge Preparation, p 92

choose from 4 types of Jeffrey Crawler-Loaders



GENERAL SPECIFICATIONS

	81-C	81-AL	81-AH	97-A
Rated Capacity T.P.M.	10	10	10	18
Tram Height	25"	32"	36"	43" or 48"
Overall Length	25'-8½"	24'-1"	24'-1"	25'-11"
Overall Width	7'-5¾"	7'-5¾"	7'-5¾"	7'-8"
Tram Speed D.C.	137	137	137	160
Tram Speed A.C.	85	85	85	160
Gathering Arm Speed—R.P.M.	55	55	55	53
Conveyor Chain Speed—F.P.M.	372	372	372	360
No. & H.P. Gathering Arm Motors (D.C.)	2—15	2—15	2—15	2—25
No. & H.P. Gathering Arm Motors (A.C.)	2—20	2—20	2—20	2—33
No. & H.P. Conveyor Motors (D.C.)	Uses Gathering Arm Motors			2—10
No. & H.P. Conveyor Motors (A.C.)	Uses Gathering Arm Motors			2—20
No. & H.P. Tram Motors (D.C.)	2—15	2—15	2—15	2—25
No. & H.P. Tram Motors (A.C.)	2—20	2—20	2—20	2—33/8.25
H.P. Pump Motor—A.C. or D.C.	4	4	4	8
Weight in lbs. approx.	21000	21000	21000	38000

Voltages: Loaders can be built for operation on any of the following voltages: 250 or 500 V, DC; 440 V, AC, 3-ph., 60-cy, 415 V, AC, 3-ph., 50-cy.

1 height

Four loaders with five heights, means you can put the correct height loader in the seam height for which it's designed. This assures proper clearance for lumps and convenient height of controls for the operator.

2 power

Available for direct current or alternating current power. Liberal size motors.

3 capacity

Jeffrey Loaders are setting high tonnage records with low maintenance cost and very little down time.

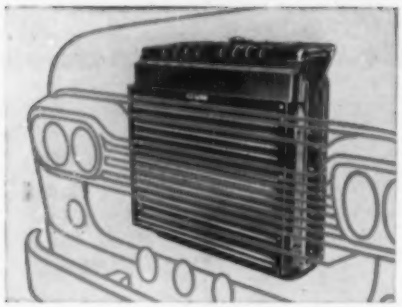
Get complete information—
Call or write your nearest Jeffrey District Office.

THE JEFFREY MANUFACTURING COMPANY
912 North Fourth Street • Columbus 16, Ohio

JEFFREY

MINING • CONVEYING • PROCESSING EQUIPMENT...TRANSMISSION MACHINERY...CONTRACT MANUFACTURING

NOW! Certified Durability



CLOSER TEMPERATURE CONTROL obtained with automatic radiator shutters means longer engine life, more efficient operation. Temperature variation between 167° and 187° with shutters as compared to 102° to 181° without shutters was reported and certified in loaded vehicle road tests.

LONGER WIRING HARNESS LIFE is the direct result of Ford's greatly improved electrical wiring system for 1960. Ford's '60 wiring harness and the 1959 wiring harness were subjected to shaker table tests plus constant exposure to oil and water vapors, and temperatures of 200°. Certified test results show a threefold increase in 1960 wiring harness life.

INCREASED FUEL PUMP RELIABILITY is an added benefit from Ford's submerged-type electric fuel pump. Certified results of dynamometer tests showed no vapor lock with Ford's electric pumps at temperatures up to 200°, whereas incipient vapor lock with mechanical fuel pump resulted in a power loss of 9% under same conditions.

It's a fact! Numerous reports from high-mileage operators of Super Duty Trucks attest to Ford's outstanding durability. Studies by an independent research firm provide certified proof that these models are even more durable for 1960.

Ford Super Duty Trucks have earned a reputation for exceptional performance and durability since their introduction two years ago. Shop service records of many leading fleets show Super Duty tractors with mileage readings between 150,000 and 250,000 and no repairs other than normal maintenance. Similar testimony to the dependability of these Big V's by other satisfied users is being added each month. Is it any wonder that '59 sales of these units were more than double those of 1958?

And for 1960, the Ford Super Duties offer additional refinements. Bigger optional axles and increased GVW's to permit greater payloads and more profitable operation. Automatic radiator shutters to keep the engine temperatures within the most efficient operating range, improved submerged-type electric fuel pumps to prevent vapor lock, and redesigned wiring for more reliable operation are typical of the improvements to be found in these units.

The changes offered for 1960 were tested and evaluated by a leading research organization. Certified results of the studies by this impartial firm (name available on request) provide proof that Ford's Super Duty Trucks are even more dependable.

- **Certified Durability through closer temperature control!** Independent research engineers certify that Ford's thermostatically controlled radiator shutters kept water temperature between 167° and 187° in severe mountain grade operation. The test truck with shutters blocked open under same operating conditions had a temperature range from 102° to 181°. The temperature variation of only 20° with shutters means less expansion and contraction in block and heads. Higher, more constant temperatures permit oil to circulate more freely, reducing internal friction. All these factors contribute to longer engine life.

- **Certified Reliability with longer-lived electrical system!** Thicker insulation on wires resists deterioration by heat, oil and gasoline. Asphalt-impregnated loom and plastic-coated mounting clips protect against abrasion. Certified results prove that the 1960 wiring harness has three times longer life.

- **Certified Reliability with Ford's submerged-type electric fuel pump!** Dynamometer tests of engines with submerged-type electric fuel pump and conventional mechanical type showed that vapor lock was non-existent with Ford's electric pumps at temperatures up to 200°, whereas incipient vapor lock with mechanical pump resulted in a power loss of 9% at an underhood temperature of 200°.

Endurance tests were run on alternators, two-speed axle speedometer adapters and other related components with similar results. Get all the facts at your Ford Dealer's now!

in Ford Super Duties!

"Our first Ford C-1000 tractor has logged 190,000 trouble-free miles since March of '58,"

says Robey W. Estes, Vice President and General Manager of Estes Express Lines, Richmond, Va. "We haven't had a single road failure and we only bring it into the shop for regular preventive maintenance work once a month.

"We use the 477 engine and find oil consumption is exceedingly low . . . only one or two quarts added between 3000-mile oil changes. Engine compression at 190,000 miles is still high and fairly equal and our drivers say that power and pep are at about the same level as when the truck had been run only 60,000 miles.

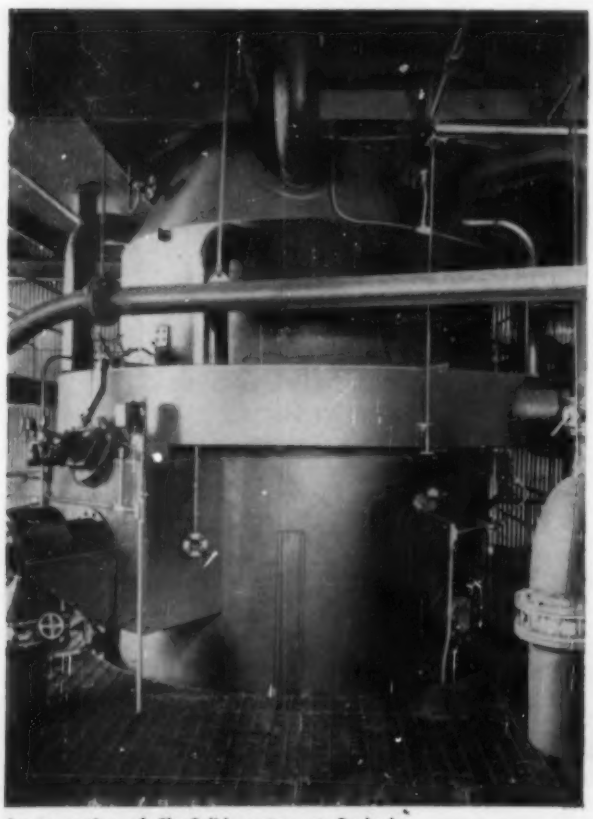
"We are grossing between 52 and 56,800 pounds with our Ford Tilts. They are giving about the same gas economy and better oil mileage than other makes in our fleet. We bought our fourth Ford C-1000 tractor last month and hope to add more soon."

FORD TRUCKS COST LESS

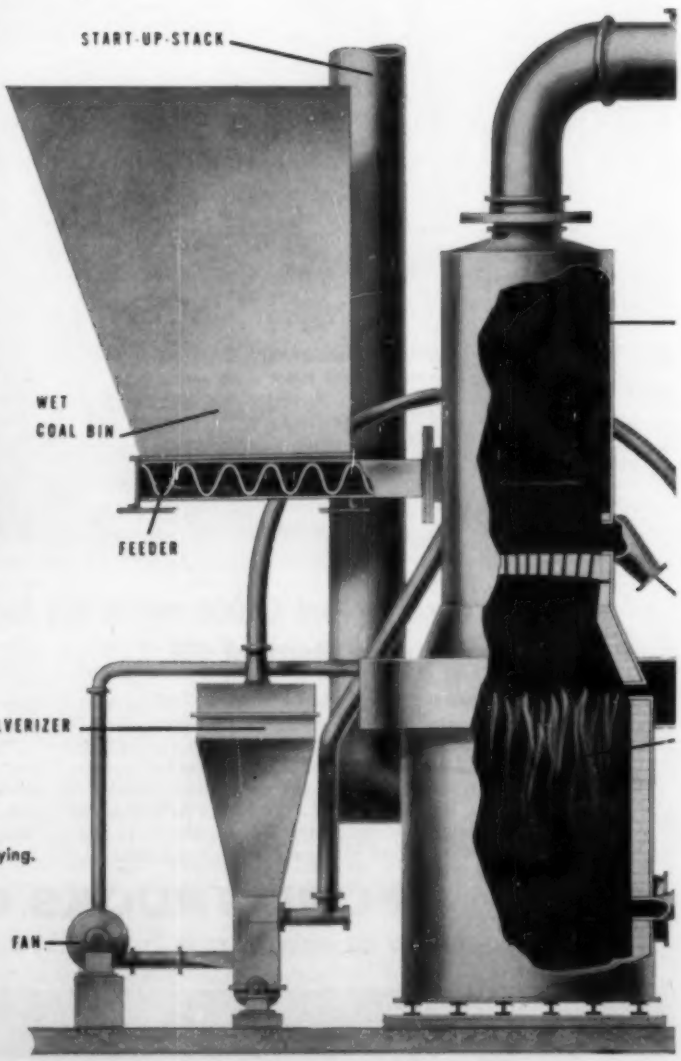
LESS TO OWN . . . LESS TO RUN . . . BUILT TO LAST LONGER, TOO!

LEADING PRODUCERS CHOOSE FLUOSOLIDS®

for drying 2,300 tph . . .
removing 40,000 gph of water in 7 modern plants

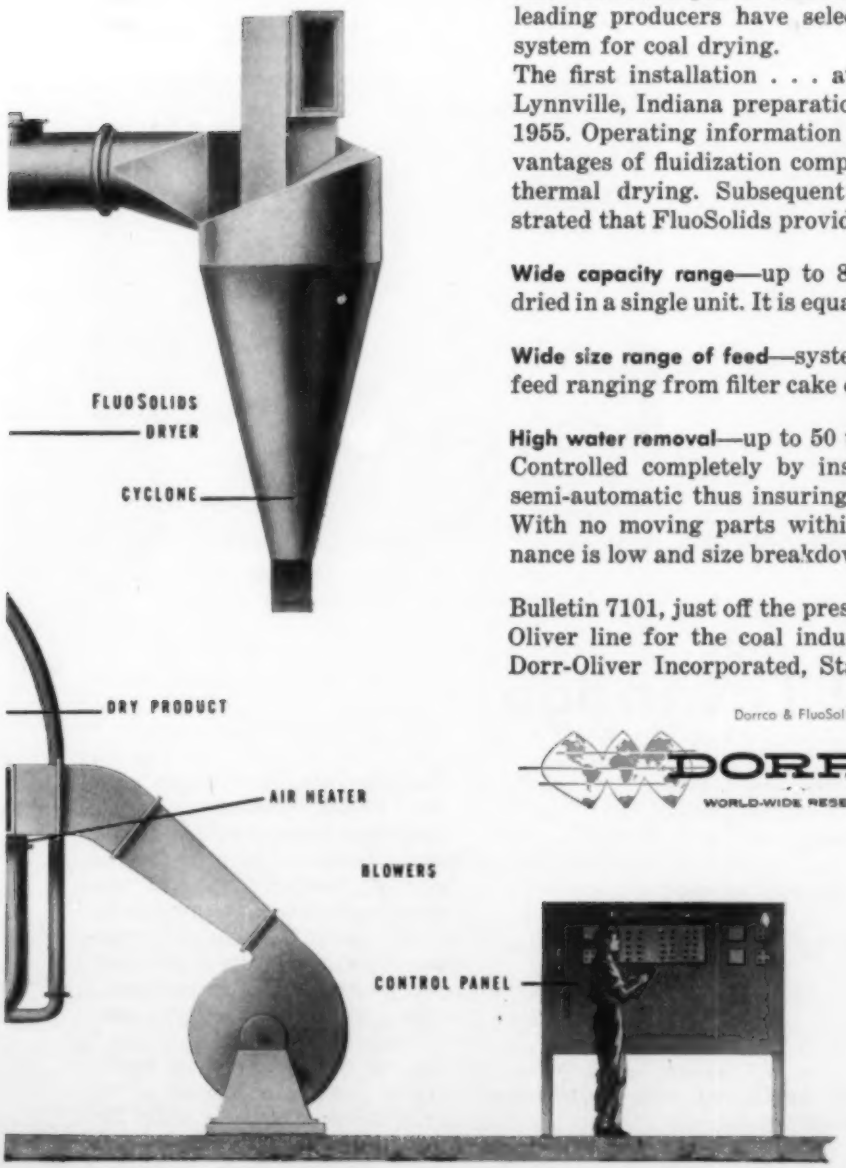


Lower section of FluoSolids system at Peabody Coal Company's installation. Feed variations from 69 to 107 tph and total moisture variations from 10.1% to 22.4% are easily handled.



General arrangement of Dorrco FluoSolids system for coal drying.

LOCATION	START-UP	DRYER DIAMETER	CAPACITY TPH	WATER REMOVAL TPH	FEED SIZE
Indiana	July, 1955	7′	100	10.	¼″ x 0
West Virginia	Sept., 1957	2-14′	700	70.	⅜″ x 0
Kentucky	Dec., 1957	14′	230	25.	⅝″ x 0
West Virginia	Oct., 1958	12′	230	17.	⅜″ x 0
Pennsylvania	July, 1959	6′	140	6.5	⅜″ x 0
Utah	Nov., 1959	14′	800	25.	1½″ x 0
Kentucky	Oct., 1959	7′	100	11.	⅜″ x 0



Since the advent of the first successful application of fluidized techniques to coal drying, many of the industry's leading producers have selected the Dorrco FluoSolids system for coal drying.

The first installation . . . at Peabody Coal Company's Lynnville, Indiana preparation plant, started up in July, 1955. Operating information proved conclusively the advantages of fluidization compared with other methods of thermal drying. Subsequent installations have demonstrated that FluoSolids provides . . .

Wide capacity range—up to 800 tph of wet coal can be dried in a single unit. It is equally economical to dry 75 tph.

Wide size range of feed—system is capable of drying any feed ranging from filter cake on up to 1½″ x 0 coal.

High water removal—up to 50 tph per dryer.

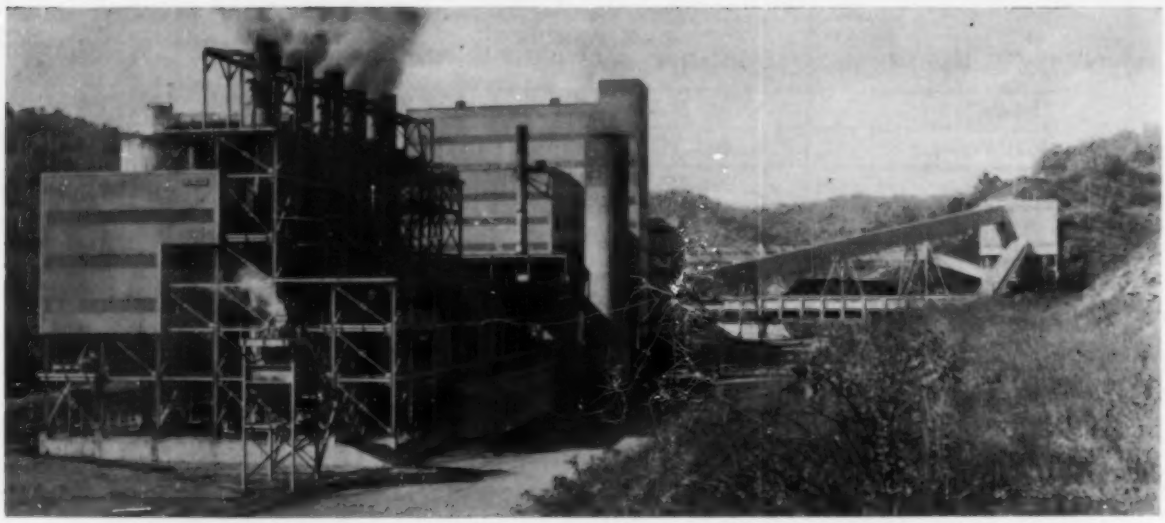
Controlled completely by instrumentation, operation is semi-automatic thus insuring uniform product moisture. With no moving parts within the dryer itself, maintenance is low and size breakdown is minimized.

Bulletin 7101, just off the press details the complete Dorr-Oliver line for the coal industry. For your copy, write Dorr-Oliver Incorporated, Stamford, Connecticut.

Dorrco & FluoSolids—T.M. Dorr-Oliver Inc., Reg. U.S. Pat. Off.

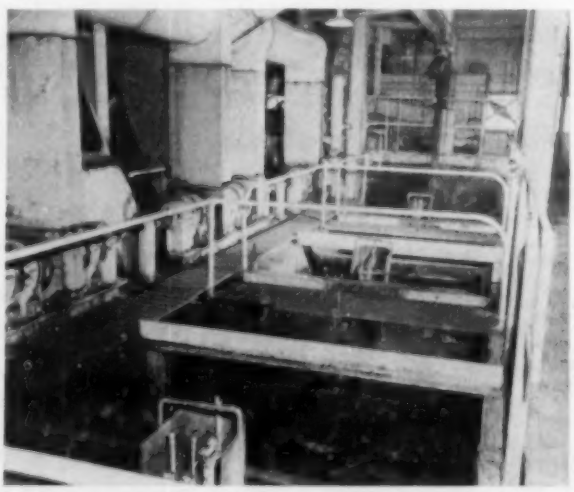
DORR-OLIVER

WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT



DESIGNED FOR 5,000 TONS PER SHIFT, Loveridge preparation plant at Fairview, W. Va., features dual cleaning circuits, centrifugal and heat drying and a closed water circuit, plus 15,000 tons of raw-coal storage in concrete bin.

OPEN-TOP BIN provides raw-coal reserve. The 170-ft thickener is major item in closed water circuit.



ALL 5x0 first passes through two 8-cell, 3-compartment jigs at Loveridge, one of which is shown here.

Preparation at Loveridge

Raw-Coal Storage—15,000 tons in open-top hopper.

Washing—Dual jig and table circuits.

Drying—Centrifugal, flash and thermal units.

Control—Three stations and three operators: main plant, drying plant and loading.

Output—5,000 tons per shift, 3 shifts per day.

MAJOR GOAL in the design and operation of the new Loveridge preparation plant is ability to ship steam and utility coal with the following guarantees:

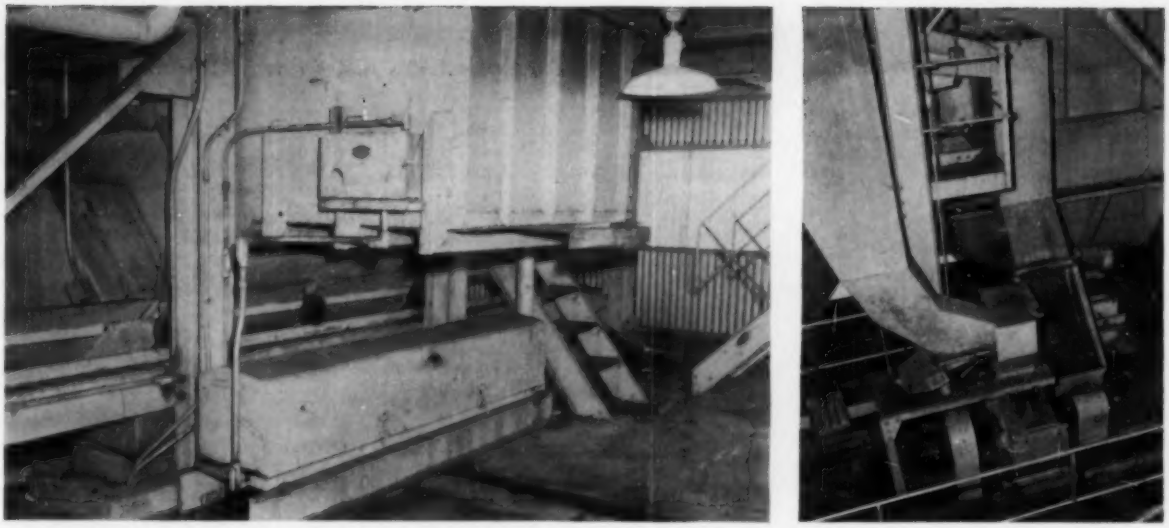
Ash, 7% maximum.

Total moisture, 3% maximum.

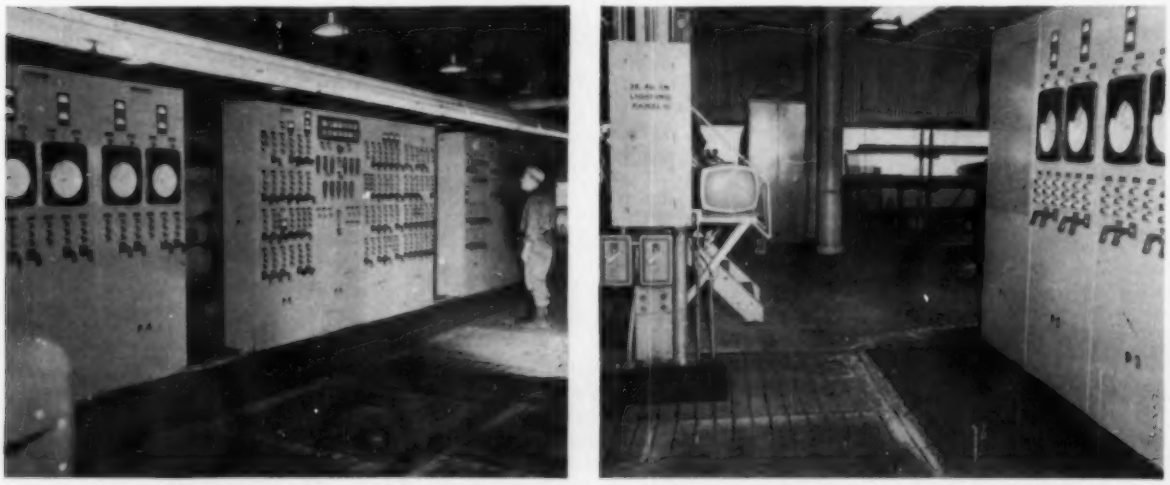
Btu, 13,600 minimum.

Subsidiary goals include operation with a minimum of labor for running the plant, loading the output and routine maintenance. Consequently, at full capacity the plant will clean, size and load 15,000 tons of clean coal per day with a total of approximately 40 man-shifts of labor, including routine maintenance.

All coal is reduced to a top size of 5 in by crushing equipment at the foot of the slope, and the entire 5x0 raw output is fed to jigs. The $\frac{3}{16}$x0



AUTOMATIC SAMPLER (left) samples 5x0 plant feed, with crusher and secondary sampler (right) on next level down. All coal not needed for analysis is chuted back to main stream for preparation.



MAIN PLANT CONTROL PANEL on jig floor permits one man to operate all washing equipment and auxiliary units. Television monitor (right) gives him a view of conditions at the main slope-belt discharge.

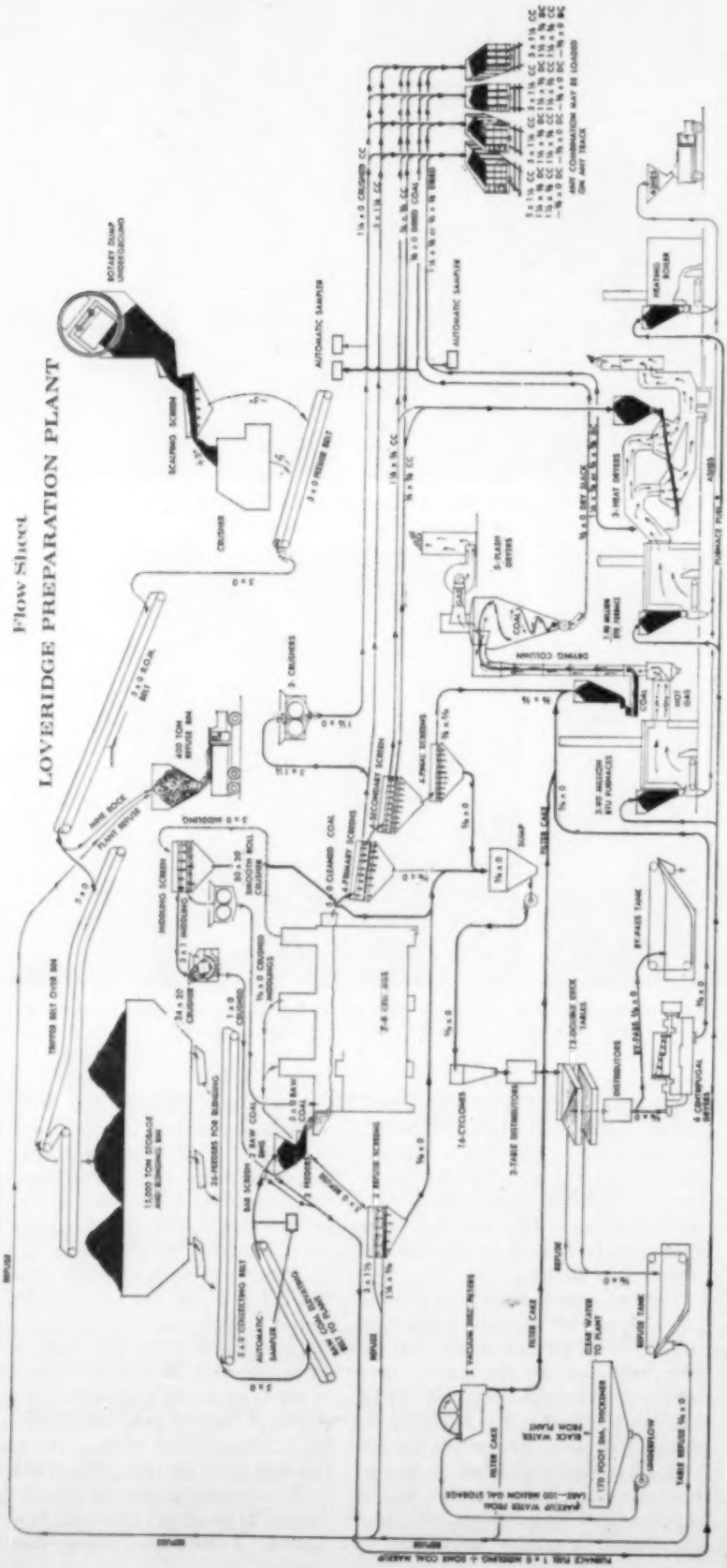
screened out of the jig product is fed to cyclones (rather than drag tanks) for thickening prior to tabling. The table product is centrifuged prior to flash drying, while the coarser fraction up to 1¼ in is dewatered on screens and in screen-type thermal drying equipment. A closed water circuit is maintained with thickening and filtering equipment. Automatic sampling equipment is provided for raw coal and all shipped sizes, and three men at three control centers handle all plant operations, including heat drying and loading.

Raw-Coal Processing, Storage

Loveridge prepares coal from the Pittsburgh seam. The major impurities are sulfur in the forms of pyrites and marcasite, in addition to organic; also material from 2½- to 2¾-in thick slate bands, plus casual rock. Average reject is 15% and the coal is classed as fairly easy to clean to the desired specifications.

The first step in processing is feeding mine-run with Syntron equipment onto Ty-Rock screens on the bottom. Plus 5-in made on the screens goes into a 36x72 McLanahan & Stone Rockmaster crusher for reduction to minus 5 in, then joining the natural minus 5 in on the pad belt leading to the main slope belt. The pad belt is supplemented by a Stearns self-cleaning magnet to remove tramp iron.

All coal is fed into an open-topped rectangular concrete bin with a total capacity of 15,000 tons, providing a king-sized cushion for either mine or plant operation if the other is forced to shut down. The bin also permits some blending by alternating draw-off among the various feeders. Coal is laid down in the bin by a traveling tripper which can be set by the dump operator to traverse back and forth automatically to place the coal in layers or, as an alternative, to discharge at four set positions along the bin, thus in effect putting the coal into four separate piles. Two 750-tph Syntron feeders at one end permit the equivalent of straight-through flow if desired. Twenty-four Jeffrey-Traylor



feeders in groups of eight draw from the other three sections and permit a degree of blending if desired. Any four Jeffrey feeders can feed the plant at a rate of 1,200 tph.

The feeders discharge into collecting conveyors which place the 5x0 on an elevating belt. This latter belt is equipped with Transweigh equipment for automatically keeping the feed rate at 1,200 tph or any other desired figure. The belt is followed by a bar screen which can provide 1x0 for furnace feed if the normal middlings supply is insufficient.

A Galigher automatic sampler also is positioned at the raw-coal belt head and supplemented by a receiving bin and vibrating feeder ahead of a Jeffrey sample crusher and a secondary sampler on the crushed material. All coal not needed for analysis is chuted back to the main stream.

Washing, Screening

The entire 5x0 raw feed to Loveridge is fed to two Jeffrey 8-cell, 3-compartment jigs, each preceded by its own surge bin and feeder. Each is followed by its own screening, crushing, tabling and centrifug-

Loveridge Highlights

Daily capacity, three shifts, 15,000 tons of cleaned coal with 15% reject. Average hourly capacity is 1,200 tons, or sufficient for daily quota in 5 hr of running time. Maximum hourly capacity is 1,500 tons. Shipments over the Monongahela R. R.

Raw-coal storage capacity, 15,000 tons in concrete bin. Dual cleaning, tabling and centrifugal drying circuits, each with its own screens, pumps, conveyors and other auxiliaries.

Three-station, three-operator plant operation: (1) Washing, tabling, centrifuging; (2) heat drying; (3) loading.

Designed and built by Fairmont Machinery Co.

Preparation engineer, Glen Hamilton.

Structure weight, 24,000 tons.

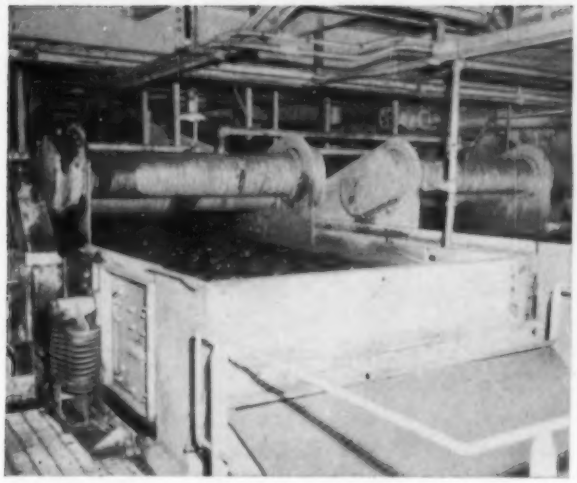
Fabricated equipment, 1,050 tons.

Concrete piles, 28,000 lin ft.

Foundations, 10,000 cu yd.

Reinforcing steel, 1,050 tons.

Aluminum sheathing, Alcoa, 104,000 sq ft; heat-drying plant left un-



THREE SETS of vibrating screens, including primary units shown here, size jig output for loading or further processing.

TWO TYPES of crushers comprise part of the facilities for processing and reclaiming coal values in middlings.

ing facilities so that half the plant can be run at any time if necessary or desired.

Two draws on each jig produce refuse, which is discharged to Lecco-Vib screens making 5x1½, 1¼x⅜ and ⅜x0 products. The latter goes to the table plant and the oversize to the 400-ton plant-refuse and mine-rock bin for final disposal by truck.

Middlings from the third draws go to middlings screens. These screen products are further processed as follows:

5x1 to a 24x20 Jeffrey Flextooth crusher; 1x0 product to the heat-drying plant for furnace fuel.

1x⅜ to a 30x30 Jeffrey smooth-roll crusher; ⅜x0 product to jig the feed.

⅜x0 to table plant.

The middlings circuit also is arranged so that all plus ⅜-in can be diverted to refuse, or to the Flextooth crusher for furnace fuel.

Clean coal from each jig goes to pairs of primary, secondary and final Lecco-Vib screens in series. Products

---

sheathed except where wet coal is handled.

Translucent panels (only two windows in plant), 27,000 sq ft.

Concrete flooring, 92,000 sq ft; concrete used for all floors where water is present; concrete and grating alternated on other floors.

Concrete roof, 42,000 sq ft.

Electric wiring, 288 mi.

Conduit, 130 tons.

Number of motors (Westinghouse), 214; total horsepower, 8,695. All motors are totally-enclosed fan-cooled Design B (normal-torque) units, except for Design C high-torque types on the centrifuges, underground dump and similar appli- with positive forced-air ventilation. An outside transformer station on cations. All motor controls are centralized in an enclosed control center the ground immediately under the north end of the center supplies 2,300-V power.

Plant drives, all V-belt or chain, with motors and Falk reducers separate. Dodge pulleys and bearing units with antifriction bearings are used throughout.

Number light fixtures, 1,500.

Belt conveyors, 5,680 total feet; Robins idlers and Goodyear belting; all pans in belt conveyors are peaked up to the center where space is available under the belt run to make them self cleaning; idea originated by G. J. White, construction engineer.

Chain conveyors, 1,950 total feet; all chain Kensington rivetless; all equipped with ⅜-in wear plates and ½-in spring-steel wear bars under chains.

Stainless steel employed for ⅜- and 3/16-in screening decks; also decks in screen-type heat dryers; 10-gage stainless used for lining all troughs, V-type, carrying water and coal; chute for dry coal equipped with ⅜-in AR plate to resist wear.

Flumes carrying water and refuse or middlings, V-type also, lined with Stonhard.

Automatic lubricating equipment (Trabon) provided for all furnace and grate mechanisms, screen-type dryers, all clean-coal and middlings crushers, ejecter mechanism on jigs, and crusher, screens, feeders and other equipment on the bottom.

Pumps, 19, with a total capacity of 28,120 gpm (Barrett-Haentjens CT, CB, VS and VT; Ni-Hard casings and casing rings; Ni-Hard or chrome impellers; all V-belt driven).

Piping, 33,160 ft.

Copper impulse lines, dryer control, 15,000 ft.

pH content of plant water controlled by lime feeder operated by dryer operator; all water from three earth-dam reservoirs with total capacity of 103 million gal up creek from plant; all water treated regardless of use, with plant care the responsibility of mechanic or electrician on day shift.

Manpower per shift, in addition to supervision, is:

Plant operator—washing, tabling, centrifuging, etc.

Dryer operator.

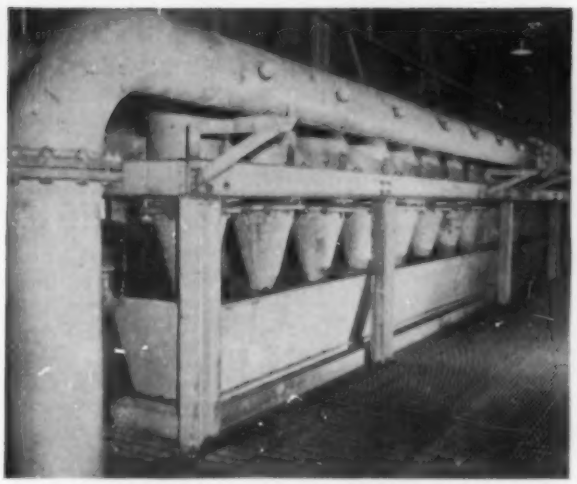
Loading operator.

Three utility men. Their duties include helping dryer operator, checking table operation and checking filter and thickening operation.

One refuse-truck driver.

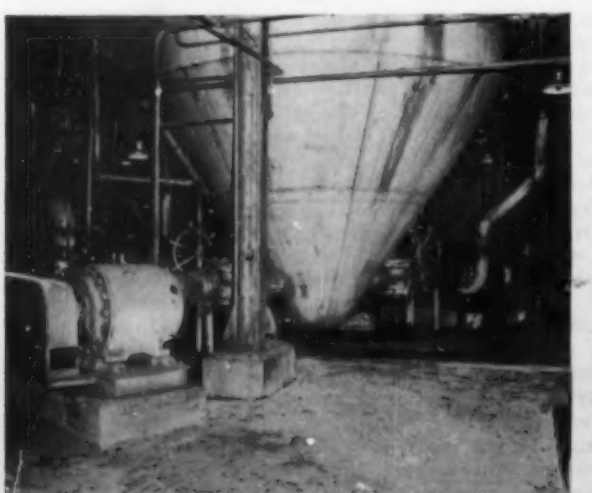
Four ground men—car cleaner, empty dropper, combination man and load dropper.

In addition a greaser, electrician and mechanic are employed on the first shift, and a mechanic and an electrician probably will be employed on the other two shifts.



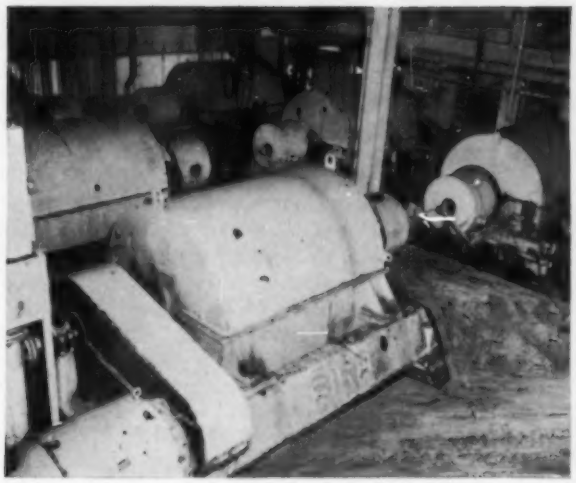
CYCLONE BANK (left) replaces drag tanks in thickening 3/16x0 for cleaning on double-deck tables (right). Though not primarily intended for desliming the cyclones split the solids at about 200M.

TWO MORE OF THE THREE CONTROL CENTERS in Loveridge plant are the drying center (left) and the loading center at right, each with one operator. Loading of any size or combination of sizes may be done on any of four tracks.

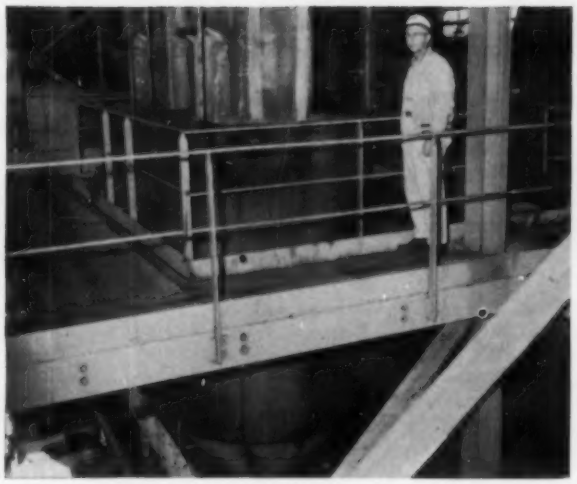


PUMPS totalling 19 with a capacity of 28,120 gpm serve Loveridge preparation plant. Three ponds hold water supply.

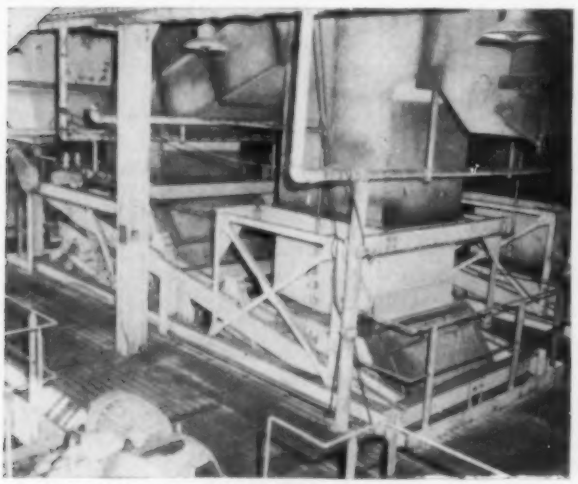
PART of the motor controllers which at Loveridge are centralized in an enclosed section of the plant.



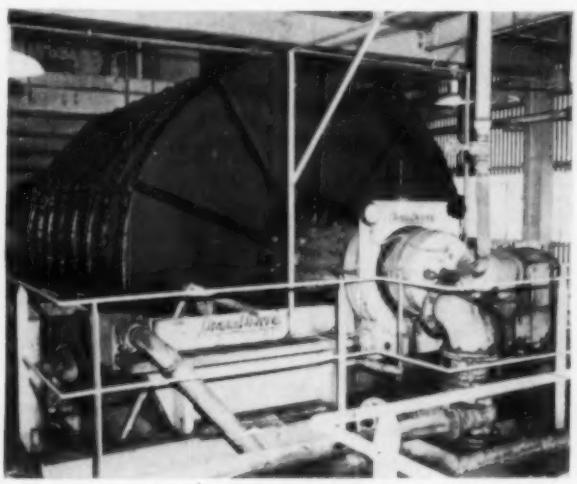
CENTRIFUGAL FILTERS dewater clean coal from the double-deck washing tables prior to flash drying.



ONE OF THE FIVE FLASH DRYERS for 3/8x0 is shown here with Glen Hamilton, preparation engineer.



COAL 1¼ to ⅜ is dried in three screen-type thermal units with their own furnace at Loveridge.



ONE OF THE TWO VACUUM FILTERS which, in combination with a thickener, eliminate water bleed.

of these screens and dispositions are:

Primary Screens

5x1¼ to loading track or to McNally-Gearmatic crushers; 1¼x0 crushed product to loading track.

1¼x⅜ to secondary screens.

⅜x0 to the table plant.

Secondary Screens

1¼x¾ and ¾x⅜ combined or separately, to loading section or McNally-Vissac screen-type dryers, normally the latter; ⅜x0 to final screens.

Final Screens

⅜x3/16 to flash-drying plant.

3/16x0 to table plant.

The table plant at Loveridge consists of 12 Concenco No. 77 double-deck units, which receive all 3/16x0

MAN AND TIME SAVER—With a highway alongside the tracks, the car dropper at Loveridge uses a bike for the long haul back from the lower end of the loaded track.

products (refuse, middlings and coal) made in the coarse-coal washing and screening operations. All come with the water to a common sump. The solids content of the mixture is approximately 20%. It is pumped to a battery of 16 Fairmont cyclones which were installed for thickening rather than the bulkier, weightier and more-costly drag tank. The cyclones are 20-in units with 3-in orifices. Though not intended for desliming the cyclones split at about 200M. Part of the cyclone overflow is used for table dressing and the remainder is returned to the jigs.

Underflow from the cyclones—about 45% solids—goes to two Concenco feed distributors. Cleaned coal from the tables (⅜ax0) goes to six Bird centrifugal dryers and then to the flash dryers. A small bypass tank is available if it is necessary to divert coal around any individual Bird.

Heat Drying and Loading

Thermal drying facilities at Loveridge are:

Five Raymond flash dryers, ¾x⅜ from the final clean-coal sizing screens and ⅜ax0 from the Bird centrifuges (about 10% moisture); each dryer has a capacity of 100 tons of dry solids per hour and in that period can evaporate 10 tons of water; drying gases provided by three 90-million-Btu Bigelow-Liptak furnaces with Firite stokers; dryers exhaust into Hanna-type dust suppressors. In these suppressors a central water jet at the bottom of a vertical stack impinges on a plate to form a spray curtain through which the exhaust passes on its way up the stack.

Three McNally-Vissac down-draft screen-type thermal dryers handling 1¼x¾ or ¾x⅜; drying gases provided by one 90-million-Btu furnace; exhaust passed into silo-type stack.

To keep coal dust from becoming a problem in the Loveridge plant the ⅜x0 dried-coal return belt is provided with a dust hood and the area in the main plant where all the dried coal is transferred to the conveyors leading to the loading station is enclosed and equipped with a 10,000 cfm exhaust fan.

Loading is done on four tracks. Any size or any combination may be run to any track at the discretion of the loading operator. Layering may be done if desired by pulling cars back with the retarding hoists. Galigher automatic samplers are provided for the 1¼x0 crushed coal, 1¼x¾ or ¾x⅜ dried and ⅜x0 dried. These samplers are followed by Jeffrey hammer mills and stationary 16 to 1 splitters.

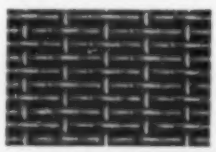
Water Handling

Since Loveridge is in a clean-stream area free of any industrial pollution it was necessary to make sure that no water was bled to the creek. Closing of the circuit was accomplished by installing a 170-ft Dorr thickener and two Dorr-Oliver vacuum filters. The primary feed to the thickener is the overflow from the table-refuse drag tank, plus other black water.

The thickener also is the point at which makeup water is added. The quantity is approximately that evaporated in the heat-drying plant, or about 65 tph. Thus the makeup rate is approximately 275 gpm. Overflow, including makeup, is circulated to the plant for various uses.

Underflow from the thickener is pumped to the filters, with the cake usually going to the flash dryers, though it may be diverted as refuse.

When you order screens, be sure to specify the type which best meets your requirements. For example:



For maximum through capacity, CF&I Space Screens with rectangular openings are recommended. The high percentage of open area provides considerable freedom from blinding or clogging.

For maximum freedom from blinding or clogging, CF&I Long Slot Space Screens are the most efficient construction. Because of the open area and intense vibration of wires on the long sides of the openings, material can not cling or build up.

The Image of CF&I offers

SPACE SCREENS

for every coal screening operation

For economical, general screening specify Wisscoloy screening made from special alloy steel. Carefully crimped and tightly woven, Wisscoloy is a rugged, general-purpose screen which provides long service on average jobs.

For corrosive conditions specify CF&I stainless steel screens. These durable screens are ideal for washing and other operations where wet, corrosive material is processed.

For scalping operations specify CF&I manganese screens. Rugged and shock resistant, they withstand the crushing, tumbling and pounding common in scalping operations and similar tough screening applications. Made of ¼" or heavier wire, they reduce costly downtime.

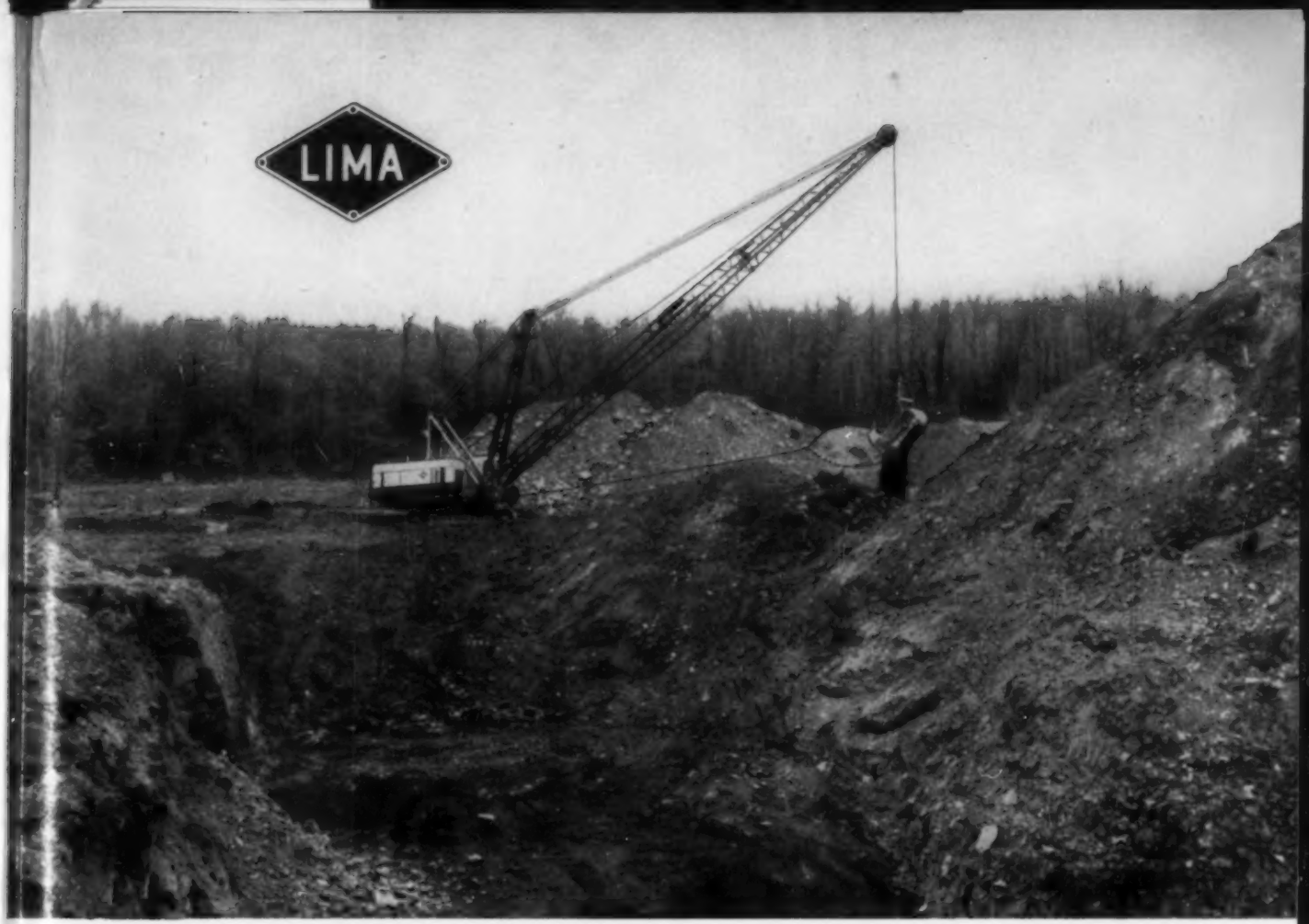
For engineering assistance in choosing the right space screen for your coal screening operation, contact our nearest branch office.

6924 B

CF&I SPACE SCREENS

THE COLORADO FUEL AND IRON CORPORATION

In the West THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte Denver • El Paso • Farmington (N.M.) • Ft. Worth • Houston • Lincoln • Los Angeles • Oakland • Oklahoma City Phoenix • Portland • Pueblo • Salt Lake City • San Francisco • San Leandro • Seattle • Spokane • Wichita *In the East* WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans New York • Philadelphia. CF&I OFFICE IN CANADA: Montreal. CANADIAN REPRESENTATIVES AT: Calgary Edmonton • Vancouver • Winnipeg



Lima Type 2400, equipped with 120-ft. boom and 7-cu. yd. dragline bucket, speeds removal of overburden in coal stripping operations near Parker, Pa.

Giant Lima 2400 delivers brute force for profitable high-output stripping

"It really pays to buy a Lima!" That's what Edward G. Kriebel, C & K Coal Co. partner, says about the firm's Lima 2400 Dragline. "We handle more yardage per shift with the Lima than we could with any competitive machine I know of," he tells us.

Lima Maintenance Low

"Lima gives you more machine per dollar than competitive makes. Its extra quality is clear to anyone who knows heavy equipment. Component parts are heavier and better made. Maintenance is low, distributor and factory service excellent.

"It's fast, smooth and easy to operate. Extra long, wide crawler tracks give the 2400 a rock-solid base on any surface, yet permit it to propel itself anywhere on the stripping site. It's a money-making machine!"

Interchangeable front end attachments make the Lima 2400 one of the most versatile heavy-duty rigs you can buy today! It can be converted in the field from variable capacity dragline to 6-cu. yd. shovel or 110-ton crane.

Quality Built Throughout

Anti-friction bearings throughout simplify lubrication, reduce wear. Big, wide air operated clutches respond instantly, lessen operator fatigue. Torque converter reduces shock loading, prevents engine stall, gives cables longer life, helps lower maintenance cost. Gears are spline fitted to shafts . . . all shafting is heat-treated alloy steel. All wearing parts are induction hardened for long life.

These are only some of the many quality features that pay off for you when you buy a Lima. There's a Lima type and size for every mining need. Draglines variable; shovels to 6 cu. yds.; cranes to 110 tons. Get full information. See your Lima distributor now or write us.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

LIMA Construction Equipment Division, Lima, Ohio

BALDWIN · LIMA · HAMILTON

Shovels • Cranes • Draglines • Pullshovels • Roadpackers • Crushing, Screening and Washing Equipment

5940

BALDWIN BLH LIMA-HAMILTON

Bumps and dips are taken in stride by the Joy 18 SC. Car bends with the floor to maintain traction and avoid "roofing." Hydraulic "traction boosters" can be engaged when extra effort is needed on bad bottom or steep grades.

SIX-WHEELED DESIGN SELECTED AT BARNES AND TUCKER MINE NO. 15

Revolutionary Joy 18SC Shuttle Car Sets Haulage Records

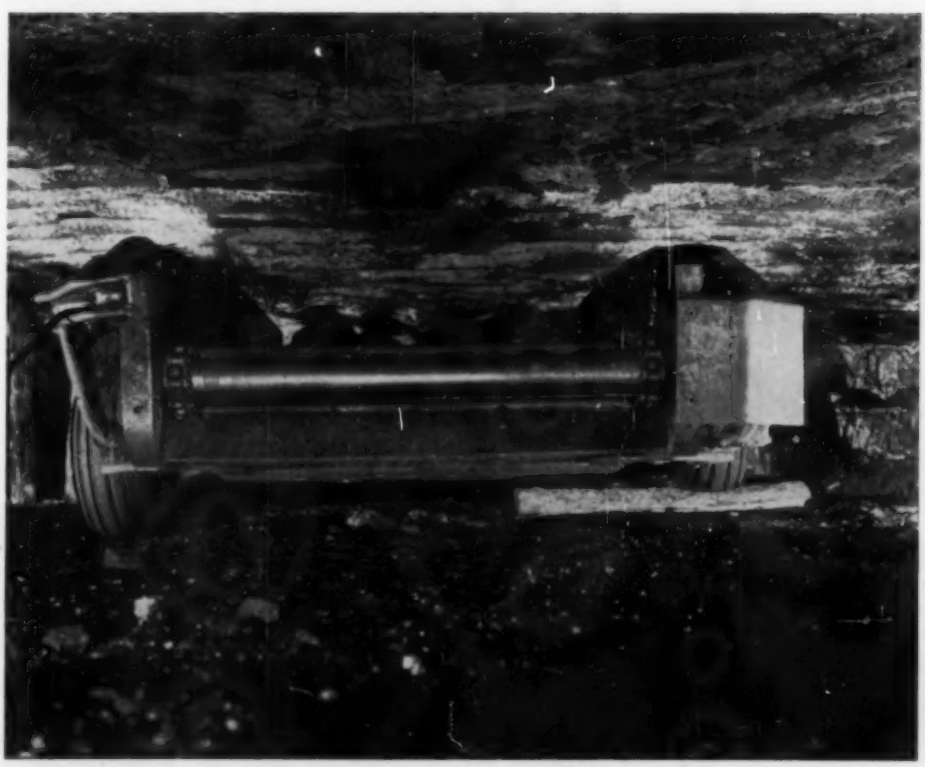
The value of the hinged-center design in shuttle cars has been thoroughly proven at the No. 15 Mine of Barnes & Tucker Coal Co. Improved trip time and increased capacity enabled Joy 18 SC Shuttle cars to establish haulage records in the mine.

Mine management attributes the outstanding performance to the ease with which the cars can be operated. The 18 SC cars are averaging more trips per shift, because the operators find they can tram at top speed in comfort and safety. Sitting between the wheels, they get a smoother ride, and needn't worry about "roofing." Since the car bends in the middle, it hugs the floor on bumps and dips. This not only prevents damage from striking the roof, but also gives extremely good traction.

Based upon the excellent results at Barnes & Tucker, and other mines, Joy is certain that another pioneering effort has paid off underground. The hinged design has proven that it can increase haulage efficiency in low and medium seams, and is the car of the future in this type of operation. Let your Joy representative give you complete details.

BALDWIN · LIMA · HAMILTON
Shovels • Cranes • Draglines • Pullshovels • Roadpackers • Crushing, Screening and Washing Equipment
5940

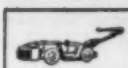
Operator gets better protection riding between wheels on the 18 SC. This, plus easy steering, enables him to tram at top speed all the way.



Straight-through conveyor gives 30-second unloading time for 4 ton loads at Barnes & Tucker No. 15.

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING MACHINERY

JOY


Coal Drills

Coal Loaders

Coal Cutters

Shuttle Cars

Continuous Miners

Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.
In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario

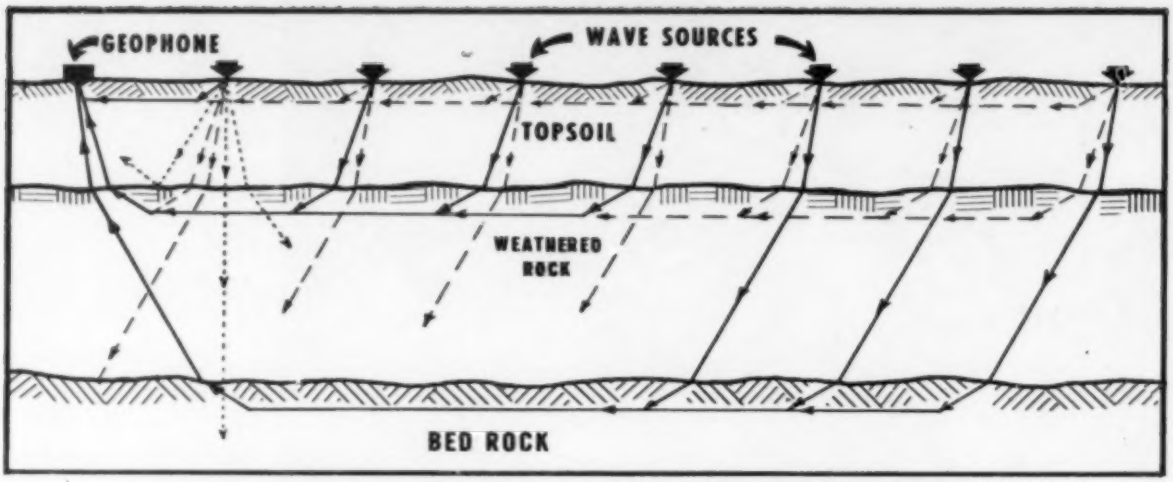


FIG. 1—Seismic waves travel at different speeds in different materials and along different paths. Solid lines represent paths of seismic waves detected by geophone. Wave is produced by hammer striking steel plate.

New Seismic Technique Simplifies Strip Overburden Analysis

Method employs refraction seismograph which measures the overall consolidation of subsurface materials, including rock hardness, stratification, fracturing and degree of weathering. Two men make study quickly.

A QUICK, easy and inexpensive method of determining the consolidation of overburden in strip operations has been developed by Caterpillar Tractor Co. The new process, called seismic analysis, is based on the principle that sound or shock waves travel through different subsurface materials at varying speeds and along different paths.

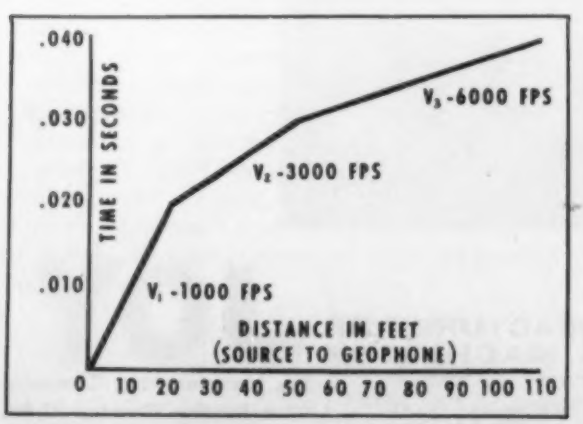


FIG. 2—Spacing of the seismic wave sources at 10-ft intervals makes possible construction of time v. distance graph.

By this method the strip mine operator can determine rippability of the overburden and, hence, the most economical method of breaking and removing it. He can tell, for example, if the material can be dozed and scraper loaded or ripped and scraper loaded; or if it must be drilled and blasted for handling by a shovel or dragline.

What the System Is

The seismic method involves use of a refraction seismograph which measures the overall consolidation of subsurface materials, including such factors as rock hardness, stratification, fracturing and the degree of weathering. It also is possible to determine the thickness of various layers of subsurface materials to depths exceeding 100 ft.

The only equipment needed is an 8-lb sledge hammer, a small steel plate, a coil of wire, a geophone receiver, the refraction seismograph and a set of tables. Two men, after a minimum of training, can perform a seismic study in a matter of hours.

Developing the System

Caterpillar sales development engineers became interested in various methods of classifying subsurface materials with the development of heavy-duty, tractor-mounted rippers several years ago. The company became convinced that on many jobs the use of rippers could reduce earth and rock-moving costs and thus make possible greater profits for the mine operator. The engineers frequently found that where rippers could be used on a production basis, dirt could be moved at lower cost than by other methods.

Studies of the relative costs of ripping and of drilling

SEISMIC METHOD of determining the consolidation of overburden at strip operations is quick, easy and inexpensive.

and blasting showed that the cost of loosening the material by ripping ranges from less than 12% to 60% of the cost of drilling and blasting. In view of the relative costs of ripping and blasting, Caterpillar felt that present methods for determining rippability of overburden material were either inconclusive or too costly, or time consuming.

Core drilling and hardness tests could provide some of the answers, but neither could completely determine rippability. Tests based on the electric resistivity of subsurface materials were becoming more common, but required considerable core drilling and highly trained experienced personnel for accurate interpretation. Introduction of the refraction seismograph for measuring overall consolidation of subsurface materials provided the answer.

How the System Works

The refraction seismograph works on the principle that sound waves travel through subsurface material at different speeds and along different paths. Speed of a seismic wave depends upon the consolidation of the material is under the surface. Depth is determined by a velocity. Path of a seismic wave varies with the speed and also with the thicknesses of the layers of materials with varying degrees of consolidation.

The seismic wave is produced by a sledge hammer striking a steel plate at various distances from a geophone receiver. The receiver is sensitive only to the first seismic wave that reaches it. Thus either the seismic wave that travels the shortest path or one that travels over a longer path but which includes a high velocity segment triggers the geophone. The time interval between the hammer blow and receipt of the seismic wave at the geophone can be read directly on the instrument panel.

Assuming for illustration that seismic wave velocities of the top soil, weather rock and bedrock are 1,000, 3,000 and 6,000 fps, respectively, it can be seen how the seismic waves traveling the longer paths can reach the geophone first. The solid lines in Fig. 1 represent paths of the seismic waves which are detected by the geophone. Dotted lines show the paths of seismic waves which have a longer travel time and, consequently, are not detected at the geophone.

Spacing of the seismic wave sources at 10-ft intervals makes possible construction of a graph of time v. distance as shown in Fig. 2. The slopes of the various segments of the curve represent the velocities of the seismic wave through each layer.

Velocity (V) of the seismic wave is found by the formula: $V = D/T$ where D is the distance from the plate to the geophone and T is the time lapse between the strike of the hammer and receipt of the signal at the geophone.

These velocities can be used to determine rippability of the subsurface materials. Caterpillar engineers recently completed an extensive program of correlating performance of rippers with consolidation of the ripped materials as indicated by the refraction seismograph. The range of seismic velocities for the common subsurface materials was obtained on construction and mining jobs where ripper performance was known. Over 200 tests were made in 18 states to complete this initial phase of the program.

How Material is Analyzed

Actual analysis of the materials on the job is simple. From 20 to 30 min are required to run each test and to determine the seismic wave velocities. A comparison of the wave velocities with those obtained in the same materials on prior jobs will give a good indication of the ripper performance and production that may be expected. On the jobs where this procedure has been followed and where the results have been observed, the determinations of rippability have been remarkably accurate and useful.

The materials must first be classified as to composition, such as limestone, sandstone or shale. Physical properties of different rocks vary in respect to their rippability even though velocities of sound waves through them are almost identical. Such classification usually is readily provided by a minimum of core drilling, observation of existing highwalls or outcrops, or a general knowledge of area geology.

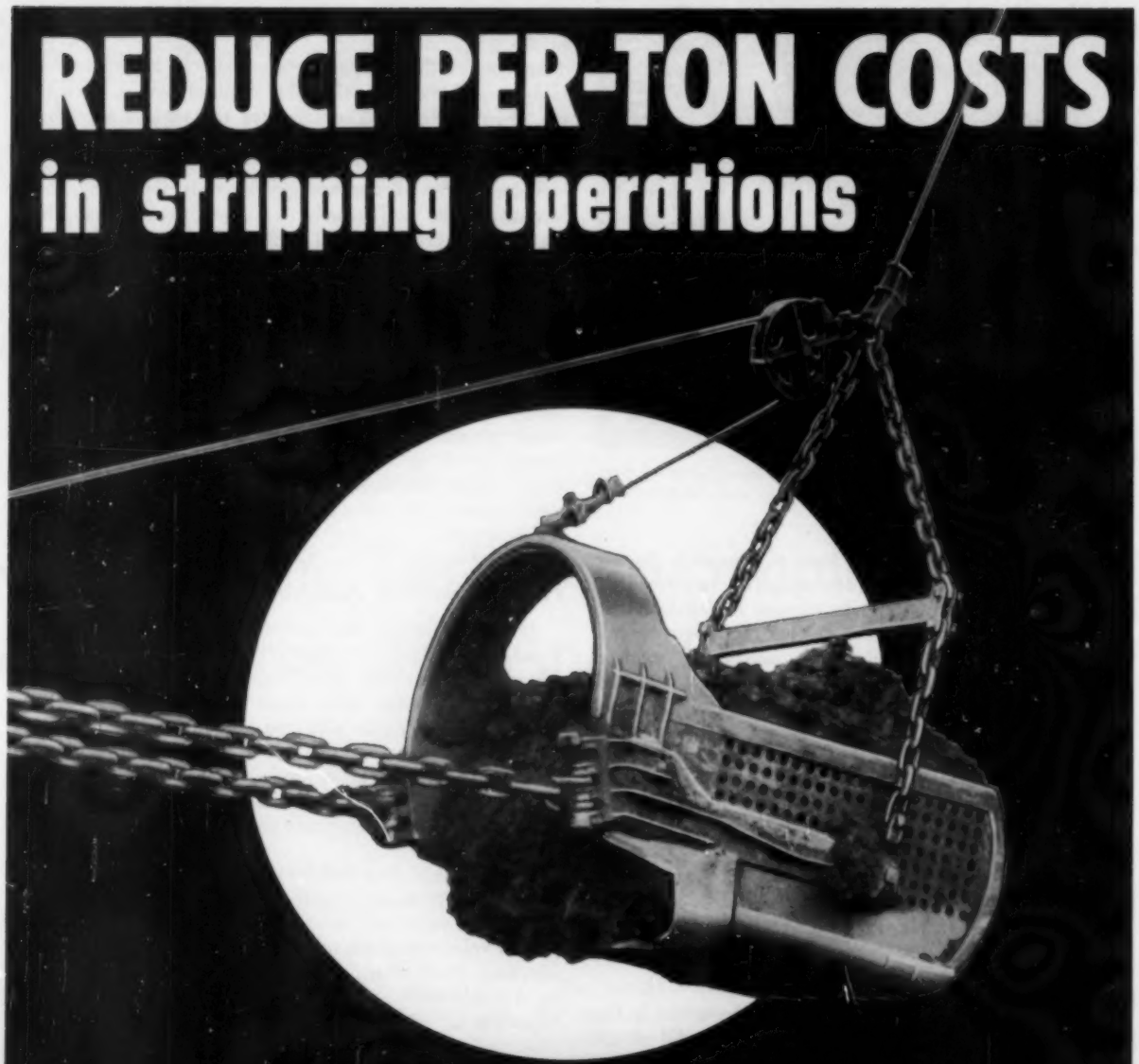
Determining Rock Thickness

In addition to determining the degree of consolidation, or rippability of each layer, it is also possible to determine the depth of each layer. This is an added bonus to the mining engineer or operator who usually is very interested in knowing how much of a particular material—the higher the consolidation the higher the simple equation based upon the seismic wave velocities and the distance from the geophone where the velocity change occurs.

$$D = X_c/2 \sqrt{\frac{V_2 - V_1}{V_2 + V_1}}$$

Where D is depth, X_c is the distance along the bottom of the graph in Fig. 2 from zero to the intersection point of the line, V_1 is the velocity of the seismic wave in the upper layer, and V_2 is the velocity wave in the next lower layer. Depths of successive layers are determined in similar fashion.

REDUCE PER-TON COSTS
in stripping operations



HENDRIX
Heavy Duty **Mining Buckets**

Increased bucket width, higher arch, tapered basket, arched lip and extra strength throughout provide unsurpassed digging, loading and dumping . . . assuring greater production at a lower cost-per-ton.

4½ to 14 Cubic Yards With or Without Perforations

HENDRIX MANUFACTURING CO., Inc.
MANSFIELD, LOUISIANA

Hendrix DRAGLINE BUCKETS

COAL AGE Operating Guide

Mine Storage Of Coal

Present Practice

Future Plans

Bin and Hopper Storage

Ground Systems

© Copyright 1959 McGraw-Hill Publishing Co., Inc., New York 36, N. Y., U. S. A.

Mine Storage of Coal

A Coal Age Special Operating Guide presenting present storage practice and future plans at anthracite and bituminous mines, outlining objectives and summarizing methods and equipment for storing both raw and prepared coal in bins and hoppers and on the ground.

Present Practice...Future Plans

MINE STORAGE of bituminous coal breaks down about like this at the present time:

Total storage capacity, raw and prepared, is about 4 million tons, or the equivalent of about 1½ days of operation.

This storage is at mines representing a little more than half the industry capacity.

Mines representing a little less than half the industry capacity do not store either raw or prepared coal and have no plans for doing so at the moment.

Mines now storing either raw or prepared coal, plus a few others not now in the business, plan to increase present storage capacity (raw and prepared about one-fifth in the near future.

About two-thirds of the capacity provided for storage is for prepared sizes, and more than 99% of this storage is on the ground. In the case of the remaining one-third, representing raw coal, the proportion stored in bins and hoppers, including blending units, is materially higher—around 15%.

Maximum ground-storage capacity reported for any one operation is 300,000 tons – in this instance raw coal; the maximum for prepared coal was 240,000 tons.

Maximum reported bin or hopper capacity for raw storage is 15,000 tons at a mine with a daily capacity of 15,000 tons also. For prepared coal, maximum reported bin capacity was 1,700 tons at a strip mine rated at 500 tpd (20- and 50-ft silos).

The motor truck, front-end loader or tractor-shovel, bulldozer and conveyor lead the list of equipment for ground storage and reclamation.

Nearly two-thirds of the mines storing prepared sizes included slack, screenings and resultants from 4 in down to ⅛ in in size. Less than half stored other sizes up to and including lump and R-O-M, meaning also that slightly more than half stored nothing but slack, screenings or resultant.

In terms of proportion of daily capacity, raw-coal storages range from 5 to 10 min of daily capacity up to 100 days (one small strip operation). The average for all reporting properties storing raw coal is about 2 days. A substantial proportion of the smaller, medium and larger-sized mines reported storages ranging from one-fourth to three-fourths daily capacity. Around 40% of the total number storing raw coal reported capacities of more than one day, with almost all properties under 1,000 tons per day in that category.

Prepared-coal storage considerably exceeds raw-coal inventories in all respects. One small strip operator reported prepared-storage capacity equivalent to 101 days of mine capacity. At the other end, small 50-ton hoppers at certain plants provide only a few minutes reserve. Maximum ground-storage capacity reported was 240,000 with a number of properties reporting 50,000, 75,000 and 100,000 tons. Average prepared storage was equivalent to 7½ days of average operating capacity for mines so storing. Many of the smaller operations reported less than one day. Mines with a daily capacity of 2,000 to 3,000 tons, however,

Table I—Raw-Coal Storage

Mine Cap., TPD	No. Mines	Total Daily Cap.	—No. Mines With Bin Capacities (Tons) of— Under 100	100–249	250–499	500–999	1,000–2,499	Over 2,500
—500	1	650	..	..	1	..	..	..
500– 999	16	10,450	4	3	2	1	2	..
1,000–1,999	15	18,900	1	1	5	4	1	..
2,000–2,999	15	35,900	..	1	4	5	3	..
3,000–4,999	19	68,500	..	..	4	3	5	2
Over 5,000	29	255,000	..	5	1	5	3	10
Total	95	389,400	5	10	17	18	14	12

Table II—Prepared-Coal Storage

Mine Cap., TPD	No. Mines	Total Daily Cap.	—No. Mines With Bin Capacities (Tons) of— Under 100	100–249	250–499	500–999	1,000–2,499	Over 2,500
—500	2	650	..	..	1	..	..	..
500– 999	11	7,400	4	2	1	..	2	..
1,000–1,999	9	11,750	2	1	..	1	..	..
2,000–2,999	10	27,100	1	2	..	3	1	..
3,000–4,999	12	43,100	..	2	1	2	1	..
Over 5,000	15	146,300	..	1	1	..	..	1
Total	59	236,300	7	8	4	6	4	1

tended to provide capacity for 1 to 2 days supply. More than three-fourths mines with a capacity of over 3,000 tons reporting storage of prepared sizes had capacities equivalent to 5 to 12 days of daily operating capacity, with a few going over 20 and up to 33 days.

The preceding are among the conclusions drawn from reports on mine storage to *Coal Age* covering 284 mines or mine groups and central plants with a total daily capacity of 942,660 tons, or approximately one-third the estimated practical capacity of the bituminous industry.

Storage Practice

Details on raw and prepared storage of bituminous, in bins or hoppers and on the ground, are shown in Tables I and II by size of mine or plant and by size of storage unit. The capacity for prepared coal is more than double that for raw coal and, as previously noted, less than 1% of the prepared sizes, including screenings and resultants, is held in bins or hoppers. Where raw coal is concerned, the proportion represented by bin capacity is much higher, though far outstripped by storage on the ground in terms of tons involved.

As might be expected, the capacity of raw-coal hoppers and bins goes up with the daily capacity of the mine. Where ground storage is involved, however, there is not too great a difference in the total put down by small, medium and large properties.

When it comes to prepared coal, however, the larger properties tend to operate the larger ground-storage facilities. Where bins are employed, however, this trend is not quite so marked.

For raw coal the mines replying to the survey showed an overall average storage capacity equivalent to about 2 days operating capacity. For prepared coal, the figure is equivalent to about 8 days of operating capacity.

Storage Expansion

How 31 out of the 284 mines and plants reporting plan to increase facilities for storing both raw and prepared sizes is shown in Table III. The group includes seven with no previous storage experience. These seven plan to install bin facilities with a capacity of 550 tons and ground facilities with a capacity of 12,000 tons for raw coal. They will, however, go much more heavily into ground facilities for prepared sizes and plan facilities for that purpose with a capacity of 18,200 tons.

The remaining 24 mines, presently operating either raw- or prepared-coal facilities or both plan additional facilities as follows:

Raw-Coal Capacity, Tons

	Present	Planned Additions
Bins and hoppers	9,765	9,600
Ground	171,400	185,000

Prepared-Coal Capacity, Tons

Bins and hoppers	2,800	2,100
Ground	239,900	293,500

Storage Equipment

Hoppers and Bins—Steel and concrete have some slight lead over wood as the material for hoppers and bins for either raw or prepared coal. Concrete includes concrete-

Practice at 95 Bituminous Mines

Total Bin Cap.	No. Mines With Ground Capacities of: Under 1,000	1,000–2,499	2,500–4,999	5,000–9,999	10,000–24,999	25,000–49,999	50,000–99,999	100,000–249,999	Over 250,000	Total Ground Cap.	Total All Cap.
400	1	..	..	1	..	..	..	..	..	5,400	5,800
3,700	..	1	1	2	3	1	1	..	..	149,500	153,200
5,530	..	2	..	2	..	..	..	..	..	12,000	17,530
8,350	..	2	..	2	1	..	..	..	..	24,200	32,550
16,900	..	1	3	4	1	..	..	..	..	54,000	70,900
60,100	..	1	1	3	3	1	1	..	1	459,500	519,600
94,980	1	7	5	14	8	2	2	..	1	704,600	799,580

Practice at 59 Bituminous Mines

Total Bin Cap.	No. Mines With Ground Capacities of: Under 1,000	1,000–2,499	2,500–4,999	5,000–9,999	10,000–24,999	25,000–49,999	50,000–99,999	100,000–249,999	Over 250,000	Total Ground Cap.	Total All Cap.
400	1	..	..	..	..	..	..	..	..	400	800
4,710	2	1	1	1	1	..	1	..	..	83,200	87,910
1,025	..	2	..	2	1	1	..	..	..	101,600	102,625
2,900	..	..	2	2	..	1	1	..	..	96,000	98,900
2,625	..	..	..	..	3	..	1	4	..	507,000	509,625
2,975	..	..	..	..	1	3	7	2	..	998,000	1,000,975
14,635	3	3	3	5	6	5	10	6	..	1,786,200	1,800,835

Table III—Reported Storage Plans at 31 Bituminous Mines

Mine Cap., TPD	Raw Storage Capacity — Present Bin	Raw Storage Capacity — Present Ground	Raw Storage Capacity — Planned Bin	Raw Storage Capacity — Planned Ground	Prepared Storage Capacity — Present Bin	Prepared Storage Capacity — Present Ground	Prepared Storage Capacity — Planned Bin	Prepared Storage Capacity — Planned Ground
150	.....	400	.....	500	.....	400	.....	.....
500	.....	20,000	.....	30,000	.....	500	300	.....
500	.....	25,000	.....	.....	1,700	4,000	.....	3,000
500	.....	50,000	200	100,000	450	50,000	300	.....
500	275	.....	600	.....	.....	.....	.....	.....
600	50	.....	100	.....	50	.....	.....	.....
800	.....	.....	.....	.....	.....	.....	.....	10,000
1,000	200	1,000	300	2,000	.....	.....	.....	.....
1,100	90	.....	400	.....	.....	.....	.....	.....
1,100	.....	6,000	.....	2,000	.....	2,000	.....	2,000
1,800	.....	.....	150	.....	.....	.....	.....	.....
2,000	.....	6,000	.....	7,000	.....	.....	.....	.....
2,000	.....	.....	.....	.....	.....	.....	.....	1,200
2,500	300	.....	.....	.....	500	3,000	.....	1,000
2,500	750	5,000	.....	.....	.....	.....	1,500	.....
2,500	.....	.....	.....	2,000	.....	2,000	.....	2,500
3,000	800	.....	3,000	.....	100	.....	.....	.....
3,000	.....	2,500	.....	2,500	.....	.....	.....	.....
3,000	.....	.....	.....	2,000	.....	.....	.....	2,000
3,000	1,800	.....	1,800	.....	.....	.....	.....	.....
4,000	500	.....	2,000	.....	.....	.....	.....	.....
4,000	.....	.....	400	.....	.....	.....	.....	.....
4,000	.....	.....	.....	.....	.....	10,000	.....	10,000
5,000	.....	.....	.....	.....	.....	60,000	.....	60,000
5,500	.....	1,500	.....	.....	.....	.....	.....	5,000
6,000	.....	.....	.....	10,000	.....	.....	.....	.....
6,000	.....	14,000	.....	14,000	.....	30,000	.....	10,000
6,500	.....	.....	.....	.....	.....	.....	.....	5,000
6,500	.....	40,000	.....	18,000	.....	18,000	.....	.....
15,000	.....	.....	1,200	.....	.....	60,000	.....	200,000
25,000	5,000	.....	.....	7,000	.....	.....	.....	.....

stave and wood wood-stave. The lead of steel and concrete is a little more pronounced at the larger operations. A very few properties report bins excavated out of rock.

Where raw coal is handled the bins or hoppers usually are single compartment for mines producing steam and general-purpose coal, though a few find blending of even these coals sufficiently worth while to install multicompartment types. Blending is much more common at metallurgical properties and the majority of multicompartment bins are found at properties of this type.

Double-screened sizes and some slacks, screenings and the like are stored in individual bins or in compartmented units.

Ground Equipment—In a very few instances raw or prepared coal may be stored on a blacktopped or other artificial surface. Otherwise it normally is laid directly on the ground —sometimes with an earthen or other dike to increase capacity per square foot.

The motor truck is the most used item of equipment for laying down raw coal, being employed by approximately half of the properties. Stocking or stacking conveyors were employed by about one-third of the mines storing raw coal, with the remainder using a variety of units, including draglines, clamshells, front-end loaders, etc.

About half the properties storing prepared coal employ trucks for laying it down. Conveyors are employed by the large majority of the remainder, particularly the larger properties, over half of which employ stock[illegible] or stacking units. A very small number employ such units as front-end loaders and the like.

Reclamation Equipment — The front-end loader and tractor-mounted shovel, plus standard shovels in a few instances, are used by about one-third of the mines in reclaiming raw coal. Usually they feed to trucks. The number of properties using conveyors slightly exceeds that using loaders, with the heavy concentration in mines with capacities of more than 3,000 tpd. These mines also, as noted, use more conveyors for laying down raw coal, though in a number of instances, with both small and large operations, the conveyors received coal from bulldozers. Bulldozer-truck combinations also were reported by some properties.

Practice with prepared coal is substantially the same as with raw, though here the proportion of bulldozers used with reclaiming conveyors is more pronounced, particularly with mines of 5,000 tpd or over. "Special" setups include at least one involving an underground loading machine and trucks. An occasional portable rescreen also is reported. Some companies store and reclaim from railroad cars, and employ shakeouts to assist in unloading the railroad equipment. A small number of clamshells also are used in storage and reclaiming — in some instances from and to railroad equipment.

Anthracite

Anthracite properties representing about one-fourth of the industry's practical capacity report raw-coal storage facilities totaling 120,000 tons, equivalent to 10 days of capacity at the properties actually storing or 4 days for all properties reporting. Practically all this storage is on the ground, and equipment includes motor trucks at all properties supplemented by stacking conveyors at about two-thirds. Shovels and bulldozers are the most popular reclaiming units, followed by conveyors.

Considerably more than three-fourths of the anthracite producers operate storage facilities for prepared sizes—again almost all on the ground. On the basis of reports to *Coal Age* the capacity of these facilities is equivalent to about 11 days running time—maximum 50 days; minimum 2½ days.

Sizes stored range from stove down to Buck No. 5. Facilities include rail-serviced yards with trimmers, but more predominately trucks with or without stacking conveyors for storing, and standard shovels, front-end loaders and bulldozers for reclamation.

About two-thirds of those responding to the inquiry plan additional facilities for both raw and prepared coal. This would increase the capacity of facilities at these particular properties approximately 50 to 100% in the case of raw coal and 15 to 50% in the case of prepared coal.

Storage Systems and Equipment

OBJECTIVES in storing coal at the mine include:

Raw Coal

1. Evening out the rate of feed to the plant, enhancing cleaning and screening efficiency.

2. Attaining greater uniformity in physical and chemical characteristics. As examples, variations in moisture may affect the efficiency of air cleaning or wide fluctuations in raw-coal refuse content may affect washing results and eventually coking or other results when the coal is finally consumed. Blending (splitting and recombining with storage as a necessary adjunct) reduces these variations.

3. Preventing mine delays from stopping preparation or preparation delays from adversely affecting mining results.

4. Permitting one-shift operation of the preparation plant with two-shift mine operation saving in cleaning-plant labor and perhaps in certain other costs. However the more labor is reduced by automaticity the less the payoff as a rule, while a penalty may be incurred by having to purchase a much-larger plant.

5. Evening out the overall production rate at the operation and thus contributing to lower cost by working more days per week with a smaller working force and fewer equipment units.

Prepared Coal

1. Increasing overall realization by storing certain sizes when demand is slack and prices are soft.

2. Evening out the operating rate on the prepared rather than the raw side with the same advantages.

3. Facilitating the serving of truck and certain other trades by having coal on hand when the customer applies.

4. Providing the benefits of blending on the prepared side or, in some instances, permitting a second shot at attaining maximum uniformity by re-blending prepared coal in addition to the initial raw-coal blending.

Capacity Required

Capacity of storage deemed necessary varies in part with the objective —blending, reduction of the effects of mine or plant interruptions, easing the problem of haulage by providing surge and storage capacity, one-shift plant operation and two-shift mine operation, or stockpiling of prepared sizes either in time of slack demand or for convenience in loading and shipping.

Blending—Since a key factor in blending success is splitting and recombining such installations normally involve at least 1,000 tons of storage in 4 to 6 compartments. This compartmentation and the normal practice of filling with a traveling belt tripper usually permits splitting each different slug of material among two or more compartments.

Reducing Interruption Effects—Here the matter becomes one of balancing cost of facilities against the cost of interruptions—after all other steps, including proper preventive maintenance, have been taken to reduce the number and effect of such interruptions. Interruptions in railroad delivery or others beyond the control of mine management are among those that might be considered in deciding whether to put in raw-coal storage. The present trend is to increase the capacity of such storage up to an hour to a day or more by either or both bins or hoppers or live ground storage.

Theoretically, the bin (or live storage) should operate half empty, so that if a capacity of 1 hr is decided on, as an example, total capacity would be 2 hr, permitting either the mine or plant to run for an hour if the other encountered trouble.

One-Shift Storage — If two-shift mine operation and one-shift preparation is decided on after investigation, the raw-coal storage, whether bin or ground, naturally must accommodate at least a shift's output. The big question then might be how much extra to take care of interruptions. But if storage is sized to take the mine peak, it probably would be full only a few days each month, and thus there might be little justification for providing extra space for this reason, though possibly for others.

Prepared Coal—Perhaps the widest variations in capacity occur in stockpiling prepared coal, which can range from, say, screenings or crushed mine-run all the way through all sizes made. In bins, capacities up to 4,000 to 5,000 tons for single sizes has been provided; on the ground, storage capacities at some plants go up to 250,000 tons or more.

Practice at a number of plants built in the past 10 yr or so and reported on in *Coal Age* is summarized in the following tabulation:

Plant Capacity, TPH	Storage Capacity, Tons	
	Raw	Prepared
	BLENDING	
750	1,000[1]	....
600	3,100	....
350	2,000	....
600	1,800	....
	STORAGE	
300	....	1,000
500	200	....
300	500	....
1,000	3,150[2]	1,500
600	*5,000	....
1,000	1,300	400[3]
150	*3,000[3]	....
425	2,000	*5,500[4]
150	100[5]	....
300	500[6]	....
400	1,600	....
900	*10,000[7]	*5,000
1,500	15,000	....
500	800[8]	....
1,000	*15,000	*36,000
750	200	4,000
1,000	500[9]	2,800
1,000	4,000	....
2,000	2,500[7]	....

* Ground facilities.
1. Total capacity is 1,400 tons. 2. One-shift preparation, two-shift mining. 3. Three ground stockpiles also available. 4. Live storage; total capacity is 12,000 tons. 5. Portal bin. 6. Two portal bins; also 120-ton bin plus ground storage at preparation plant. 7. Also blending. 8. Ground storage also available. 9 Provision made for future ground storage of 5,000 tns.

Stockpiling—In addition to the preceding tabulation general industry practice in mine storage, as derived from a *Coal Age* survey, is summarized at the start of this special report. It shows raw-coal stockpiles of 300,000 tons or more and prepared of 240,000 or more. This represents a growing practice aimed at providing more running time in the slack summer season, taking care of slow moving sizes at certain periods, or providing reserves of coal—either raw or prepared—for meeting peaks that may be encountered at certain times.

At current costs, a 300,000-ton reserve would tie up probably $1 to $1¼ million in outlays for labor, power, supplies and other out-of-pocket items, while the cost of putting it down and picking it up is a fairly substantial figure. However, in view of the growth in number and size of such storages it pays off by permitting

increased sales at times when prices are firm.

Space Requirements—Angle of repose and weight of broken coal per cubic foot, in addition to ground area available, are among the factors involved in calculating either the space or cubical content of storage or, contrariwise, where only so much space is available, how much can be stored.

Angle of repose varies from as low as 27 deg for prepared egg and stove anthracite up to 35 to 40 deg for bituminous mine-run with a fair percentage of fines. Small-sized screenings, and slit and dust with a fair amount of moisture, sometimes will stand at up to 50 deg or slightly more.

Weights of Coal — Broken-coal weights normally employed in calculating storage requirements are, per cubic foot:

Bituminous mine-run, 53 to 55 lb.

Bituminous coarse sizes, 46 to 53 lb.

Bituminous slack, 45 to 60 lb.

Anthracite domestic sizes, 50 to 60 lb.

Anthracite steam sizes, 52 to 56 lb.

For less-precise approximations, some use 55 lb per cubic foot for prepared anthracite and 50 lb for bituminous.

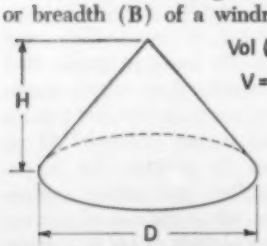
Stacking—The height (H) of a coal of a given diameter is a function of the angle of repose (A), or one-half the diameter (D) multiplied by the tangent of the angle of repose (A), or $H = \frac{1}{2} D \tan A$. Tan A for various angles of repose (A) is:

Deg	Tan	Deg	Tan
28	.5317	36	.7265
30	.5774	38	.7813
32	.6249	40	.8391
34	.6745	42	.9004

To determine the spread, or diameter (D), of a conical pile of a given height (H) the formula is:

$$D = \frac{H}{\text{Tan A}} 2$$

This formula also gives the width, or breadth (B) of a windrow.



Vol (V)--cu ft

$V = \frac{1}{12} \pi D^2 H$

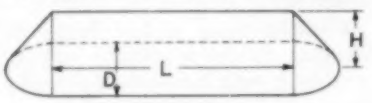
The volume of a coal in cubic feet is given by the formula

$$V = 1/12 \pi D^2 H,$$

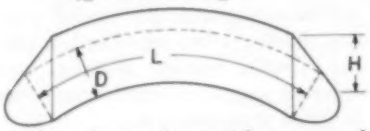
and the capacity in tons (T) by multiplying the volume by pounds per cubic foot (W) and dividing by 2,000 or

$$T \text{ (tons)} = \frac{VW}{2{,}000}$$

If coal is dumped into a conical or approximately conical hopper, the total volume and tonnage becomes the sum of the volumes and tonnages of the upper and lower (inverted) cones.



$V = \frac{1}{12} \pi D^2 H + D \frac{1}{2} HL$



The volume of a straight or curved pile in effect is made up of the volume of two half cones plus the volume of the windrow between, or

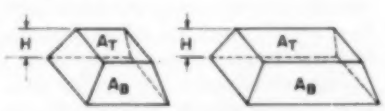
$V = 1/24 \pi D^2 H + (D 1/2 H L) + 1/24 \pi D^2 H$, or

$V = 1/12 \pi D^2 H + (D 1/2 H L)$, where

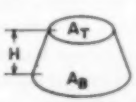
D = width of the pile and

L = length of the pile between the two half cones.

This formula applies whether the pile is straight or curved if L is measured along the center line of the curved pile.



$V = 1/3 H (A_B + A_T + \sqrt{A_B A_T})$



Low-flat-topped piles made by truck dumping, conveyor dumping with scraper or bulldozer spreading, etc., can be square, rectangular, oval, circular or irregular in shape. If sides are left to take their natural slopes the volumes for square, rectangular and circular piles are derived from the following formula:

$$V = 1/3 H (A_B + A_T + \sqrt{A_B A_T})$$

Where,

H is the height;

A_B is the area of the base;

A_T is the area of the top.

With a known length and width or diameter of base and a known height, the length and width, or diameter, of the top is obtained by dividing the height by the tangent of the angle of repose, then doubling the answer to account for both of the sides or ends as the case may be, and then subtracting this doubled figure from the length, width or diameter of the base.

With the volume known, the capacity of the pile is obtained from the formula previously given, or

$$T \text{ (tons)} = \frac{VW}{2{,}000}$$

Hoppers and Bins—It is possible to have a true square or rectangular bin in coal mining but normally what is called such actually is part square or rectangular and part an inverted pyramid with the point knocked off, otherwise known as the frustrum of a pryamid. In some instances, of course, this frustrum is the complete bin or hopper.

Calculating volume and capacity therefore requires consideration of a mixture of shapes, in addition to, if complete accuracy is required, allowing for the fact that a cone with the angle of respose of the coal in question is formed at the top where coal is fed in.

Unless a very complicated formula is employed to determine the volume of the top cone or windrow in a square or rectangular bin the best that can be done is a reasonable approximation, using the formulas previously given to obtain the volume of the top cone and also the bottom sloping section or frustrum, to which is added the volume of the square or rectangular part, if any (length times width times height).

A true cylinder also is a bin possibility but here also the bottom is usually something else—a frustrum of a cone—and the coal forms a cone in the top. Compared to square or rectangular bins, volume can be precisely determined by using the previous formulas for the volume of a cone and the frustrum of a cone, adding to this the volume of the cylinder of coal between the two, as follows:

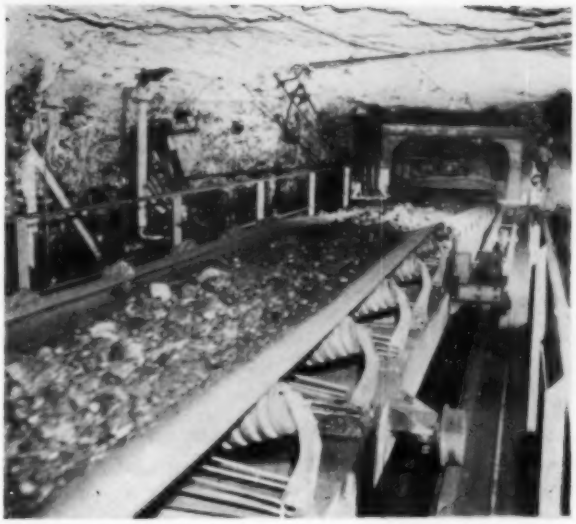
$$V = 1/4 \pi D^2 H$$

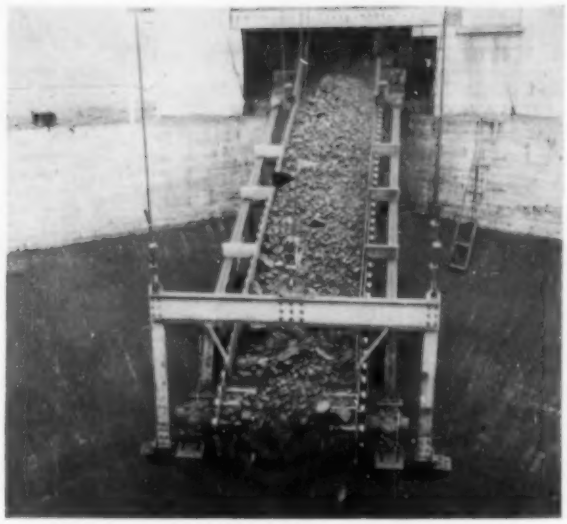
Tonnage is determined according to the previous tonnage formula.

Sizes and capacities of certain bins or hoppers actually employed are as follows:

Underground hopper receiving coal from dropbottom cars, 12 ft wide, 40 ft long, 10 ft deep—97 tons.

Underground hopper with shuttle-type distributing conveyor, 16 ft wide, 66 ft long, 18½ ft deep maximum—260 tons.





SHUTTLE BOOM feeding into 260-ton underground hopper at foot of slope increases hopper capacity. Desire for still larger capacity (500 tons) resulted in moving hopper to surface, still with boom deposition.

Underground hopper between seams, dropbottom cars, 114 ft long, 22 ft wide and 50 ft deep—1,550 tons.

All these bins taper at 40 to 45 deg to feeder throats in the bottom, the taper usually starting at some point down from the top—up to 7½ ft in the case of the 1,500-ton job.

Examples of circular bins include the following:

Silo, 24 ft in diameter, 55 ft high—600 tons.

Double silo, each 40 ft in diameter and 51 ft high—3,000 tons.

Single silo, 44 in diameter and 53 ft high—1,600 tons.

Two plans for ground storage at two new mines provide the following:

Conical pile fed by slope belt, 68 ft maximum height, 170 ft in diameter at the base 40-deg slope—12,000 tons.

Windrow pile, formed by stacker running alongside, 73 ft wide at the base, 200 ft long and 26 ft high—8,000 tons.

Bins and Hoppers

Depending upon individual circumstances and objectives bin and hopper storage takes a variety of forms. The major ones are summarized in the following material.

Dump Hoppers

For the most part merely a convenience in feeding in the early days of the industry, if used at all, the dump hopper now is deliberately used to provide at least some or all of the benefits previously listed at both deep and strip operations. Capacities of 50 to 250 tons are fairly common, though the number of larger units—up to 1,500 to 2,000 tons or more—is increasing. Mine cars are dumped directly into such hoppers as a rule—either singly or in trips. Individual dumping is the rule with trucks, and where this is the practice grizzlies may be employed to keep out chunks that might stick in the hopper throat or jam the feeder.

An increasing practice is to follow dump bins or hoppers, whether underground or on the surface, with preliminary crushers. Quite frequently the cushed mine-run is fed to main hoppers, bins or silos for storage or for blending. Some examples are summarized in the following:

Storage From Conveyors

With all-belt haulage the outside hopper capacity for raw coal normally is provided at the terminal point. If a slope belt is required the storage may be at the foot of the belt or on the surface. Underground, about the only way of providing storage is to excavate a hopper in the bottom. The cost of such excavation, lining and the like normally keeps the size of such hoppers down to 100 to 200 tons. As a result, the tendency is to switch to surface storage. In one instance, where a hopper was considered desirable, it was excavated on the surface, which permitted a capacity of 500 tons, compared to 260 tons underground.

Common practice with hoppers of this type is to provide booms for laying down the coal. Two examples are shown in accompanying illustrations. Such booms reduce breakage and permit utilizing more of the capacity of the hopper when needed.

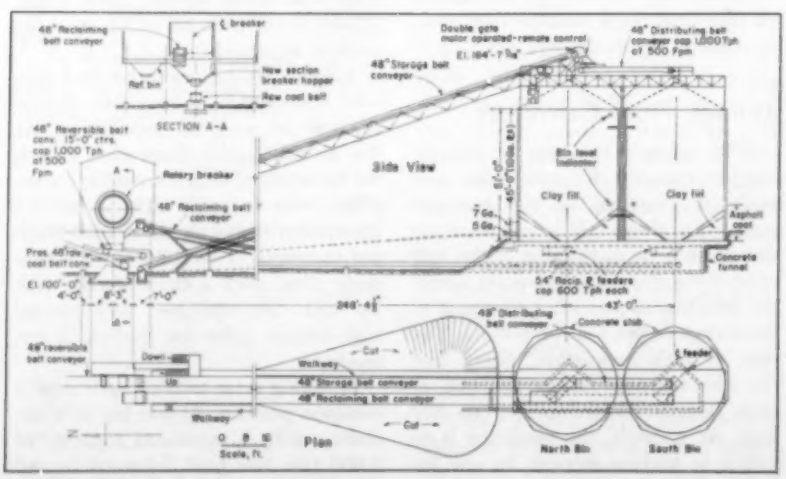
Surface bin installations fed by conveyors may serve as intermediate stations between face and tipple, with the first stage the main belt and the second stage mine cars, belts or trucks to the plant—usually the latter. Such a setup is especially advantageous in "punch" or "contour" mining where the opening moves around the outcrop; also when several small tracts are involved, each of which must be worked separately.

A small 100-ton elevated steel bin, with accompanying rock bin, is one example of such an installation. As the accompanying illustration shows, the installation, which is readily moveable, feeds to mine cars. A second illustration shows an installation feeding to trucks. Two 250-ton concrete-stave silos, with a third smaller unit for rock, are equipped with special high-volume gates for loading 25-ton trucks.

Crushing prior to binning is now a common practice. At one big new operation with a maximum capacity of 2,000 tph, raw coal delivered by rail from various mine openings, each equipped with its own mine-run bin,

100-TON ELEVATED STEEL BIN (left) receives coal from belt and transfers it to cars. Transfer to trucks is another and more common version illustrated at the right. Smaller rock bins are installed in both instances.

MAJOR RAW-COAL BINNING INSTALLATION receives coal from railroad cars. After preliminary crushing the coal goes into 2,500-ton circular storage bin.



TWO STEEL SILOS with clay- filled corners, preceded by a rotary breaker, provide 3,000 tons of storage at a strip operation in addition to 1,000 tons in the dump hopper.

the railroad cars discharge to a 200-ton double-feeder hopper followed by a 36x72 double-roll crusher to reduce the feed to 4x0. It then goes to a 2,500-ton circular storage bin (see illustration) equipped with four feeders for putting the coal on the plant-feed conveyor.

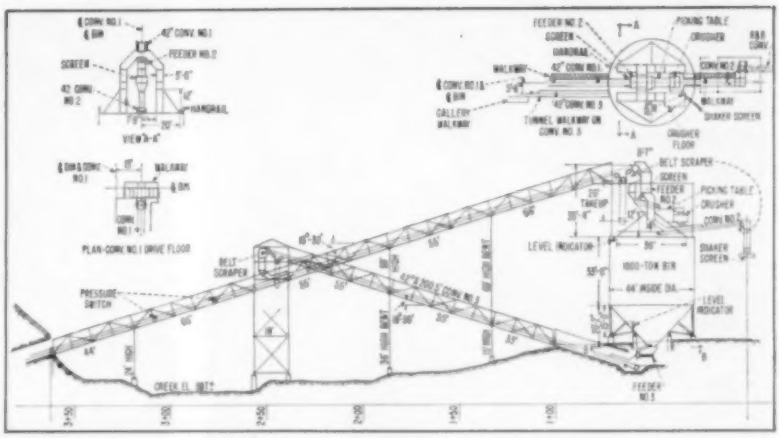
A rotary breaker reducing the feed to 6x0 is the unit employed ahead of a double-silo plant (illustrated) at another mine. Capacity of the two silos is 3,000 tons, which is in addition to 1,000 tons available in the original truck dump hopper. The silos, of corrugated liner plate, sit directly on the ground and are not provided with sloping hopper bottoms. Instead the corners are filled with clay, which was used instead of coal to avoid the possibility of spontaneous combustion.

Ability to feed back may be an asset at times. One installation with such provision is illustrated. The slope belt from the mine can feed to a 1,600-ton silo-type bin. Its capacity is enough for one production shift, permitting the mine to run two shifts and the plant one. Overall efficiency is increased by permitting independent operation. A return conveyor, as illustrated, puts coal from the bin back on the slope belt during the preparation shift.

A somewhat different type of storage installation, but with the same objective of two-shift mine operation and single-shift plant operation, is shown in another illustration herewith. Seven in-line silos fed by belt and traveling tripper store 3,100 tons after crushing as desired. This ar-

rangement also provides a substantial degree of blending and the bins also are available to take care of mine output during plant interruptions and vice versa. Silos also are used for prepared sizes at this property, as detailed below.

Capacity for three full operation shifts is provided in a 15,000-ton open-top hopper at one new mine. Coal is first crushed on the bottom to 5x0 and put on a slope belt feeding a tripper belt over the hopper. Two big feeders in one end of the hopper permit the equivalent of straight-through operation. Twenty-four others permit feeding out any desired sections, thus facilitating blending if desired.



FEEDBACK to slope belt from 1,600-ton steel bin permits one-shift plant operation with two-shift mine operation.

Prepared Coal

Silos for serving the retail trade at the property discussed in the second preceding paragraph are built on a curve and are filled by a radial stacker, as illustrated. Each of the five units has a capacity of 300 tons, and discharge gates are at a convenient height for truck loading.

Elevation for convenience in loading features a cluster of seven in-line steel bins (illustrated) for 2½x0 or other sizes. They are fed through gates by a chain conveyor from the main plant. Concrete funnels are installed in the bottom of each unit to permit complete discharge and prevent degradation when storage is lengthy.

A somewhat different type of storage bin or tank is provided for slack at one new property (see illustration). Cones at the top and bottom of each are separated by a central cylindrical section, and each has a capacity of 1,400 tons. Coal is brought to them by belt conveyor and two short 30-in boom or feeder belts are employed for loading trucks. A standard circular steel bin in another part of the same plant provides storage for egg.

Automatic loading of trucks with preset weights of coal is a possibility in serving retail customers. Such an installation is shown in an accompanying illustration. Conveyor scales on the loading conveyors record weights and the total can be preset so that the conveyor stops when the proper weight is measured out and loaded.

Another type of prepared-coal bin

SEVEN IN-LINE SILOS store 3,100 tons after crushing for single-shift-plant operation with double-shift mining, plus blending.

OPEN-TOP HOPPER fed by tripper belt provides capacity of 15,000 tons of raw coal or sufficient for three operating shifts. Multiple feeders permit blending.

RADIAL STACKER fills retail silos mounted on a curve. Each has a capacity of 300 tons.

SEVEN IN-LINE STEEL BINS with concrete-funnel bottoms feed to retail trucks. Coal is delivered to bins by chain conveyor.

DUAL 1,400-TON TANKS store nut and screenings at one property, with a standard hopper also provided for egg.

AUTOMATIC LOADING of preset weights by belt booms features this retail storage and loading plant.

MULTICOMPARTMENT BIN INSTALLATION (left) typical of a number employed for blending, particularly of metallurgical coals.

is the multiple unit, usually fairly small in capacity, found in some prescription-mix installations. In such installations each bin or compartment holds a certain size, and variable-speed feeders permit making a mix with precise percentages of each fraction included.

Degradation is a factor in binning mine-run or prepared sizes. If of sufficient moment bins are easily equipped with ladders or spirals to reduce it to the minimum.

Raw-Coal Blending

Since the secret of blending raw coal to improve plant performance and in turn final quality is splitting

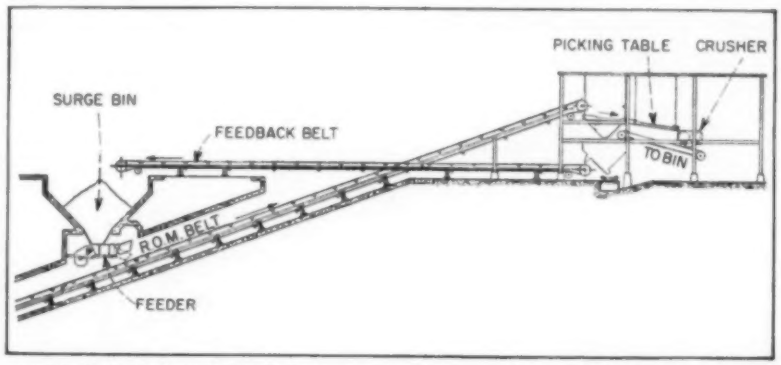
WIDELY USED MOBILE RECLAIMING UNIT is the front-end loader. Machine has 12-ft-wide 6.03-cu yd coal-bucket.

PORTABLE LOADER with swivel boom reclaim's prepared coal to trucks.

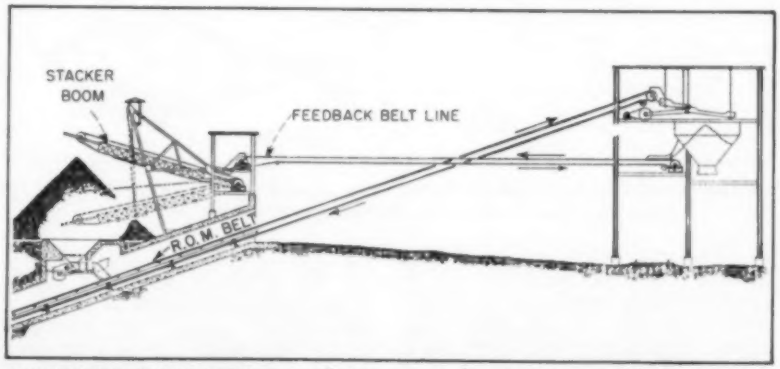
and recombining, such installations are either multicompartment or an in-line or other convenient arrangement of single bins. A typical multicompartment unit is shown in an accompanying illustration. Live capacity is 1,000 tons in five compartments and, in line with usual practice, the coal, after preliminary picking and crushing, is distributed to the five compartments by a traveling tripper and removed by variable-speed feeders.

Normally, as noted, such installations are designed to handle raw coal only. In a few instances, for the last word in blending, the raw-coal facilities also have been supplemented by similar installations for the cleaned coal.

As previously noted, the largest majority of blending installations are for metallurgical coal, though a few are used to improve cleaning results at mines producing steam coal.



RETURN VIA SLOPE BELT features ground-storage plan with feedback conveyor.



INCREASED CAPACITY in ground storage over slope belt is provided by adjustable stacker. Using a dozer, scraper, dragline, etc., yields still another capacity increase.

Ground Storage

Storage of raw or prepared coal on the ground might, among other systems, be classified according to type of equipment employed:

1. Mobile.
2. Fixed—conveyors for example.
3. Combinations of mobile and fixed.

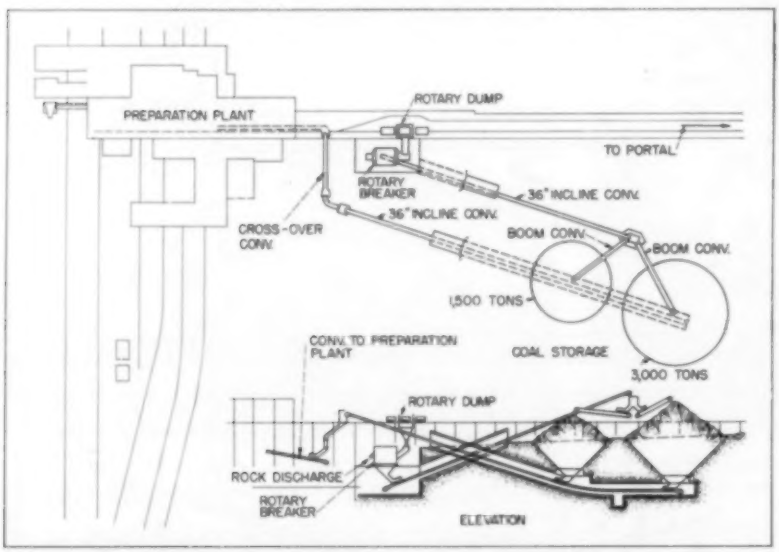
Mobile-Equipment Storage

The maximum in simplicity and flexibility can be secured by using trucks and bulldozers or tractor- or self-powered scrapers with bulldozers. In fact, the job may be done by a bulldozer alone, pushing out a moderate distance and back to a hopper at ground level. It is possible to store and reclaim with scrapers alone also but a bulldozer normally is a paying adjunct. A possible drawback, however, is the need for a larger storage area for the same tonnage because of difficulty in piling high with trucks or scrapers.

Several properties report that their raw-coal facilities consists of a truck and bulldozer, the former laying the coal down and the latter pushing it to the plant hopper when

PARALLEL BELTS with stacker, hopper and return feeder feature this optional-flow arrangement.

RADIAL STACKER permits increasing capacity of this in-line raw-coal pile to 3,000 tons with minimum height.



OPTIONAL-FLOW plan includes rough cleaning and distribution to two pits by boom conveyor. Reclamation is by feeders to subway conveyor.

needed. Truck dumping with no attempt to heap usually leaves a pile 3 to 6 ft deep, meaning that each 100 sq ft of storage area will hold 8 to 15 tons. If the bulldozer is used for piling or a scraper is employed the capacity per 100 sq ft can be increased appreciably.

In pushing to the hopper a bulldozer can handle a considerable tonnage up to 300 to 500 ft, and a scraper up to 1,000 to 1,500 ft. Beyond that, reloading begins to come in where trucks are used. Standard shovels are employed for such reloading at a number of operations, but the preferred device at plants using mobile equipment is the tractor-mounted shovel or front-end loader. This latter unit may, at times be used instead of the bulldozer to push or carry coal to the plant hopper if the distance is short.

Prepared coal of the screenings or resultant type may be handled similarly to raw coal by trucks and bulldozers, scrapers and the like. With the larger screened sizes, however, the question of degradation becomes a major factor. However, such sizes can be laid down by truck if piling is not necessary, and can be reclaimed with any of the usual loaders. Rescreens can be fitted to the discharges of certain types of loaders, such as the elevating-conveyor type on rubber tires. Or separate units can be employed with other types of equipment, as at a few operations.

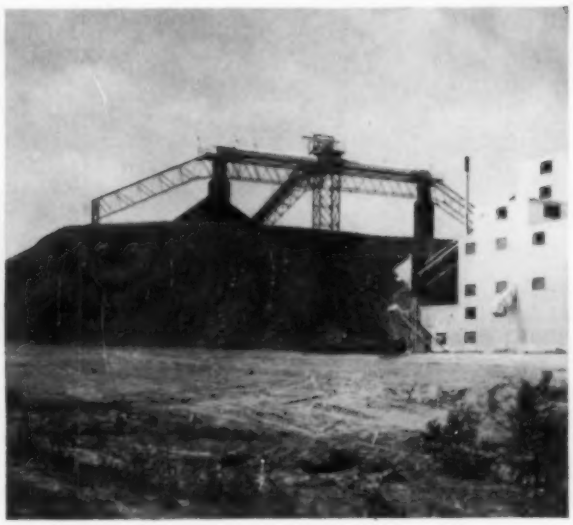
Use of the front-end loader, in this instance equipped with a 12-ft-wide 6.03 cu yd bucket, in reclaiming to trucks is shown in an accompanying illustration. In addition to loading the unit also stocks and handles yard maintenance and cleanup. Another illustration shows a rubber-tired loader with a swivel-type discharge arm. Capacity ranges up to 10 cu yd per min.

Conveyor Storage

Ground-storage systems of the fixed-equipment type are almost exclusively built around conveyors for both stocking and reclaiming. Normally each installation is limited to one size, which makes for some inflexibility. On the other hand, such installations can handle coal almost or completely without labor and thus tend to provide the lowest possible cost.

All-conveyor systems are used for both raw and prepared coal—in the case of the latter almost always screenings or a resultant that can be handled like raw. However, some plants regularly store and reclaim several screened sizes by installing storing and reclaiming units—either or

SPIRAL following stacker at this in-line storage pile at a strip mine reduces breakage in laying the coal down.

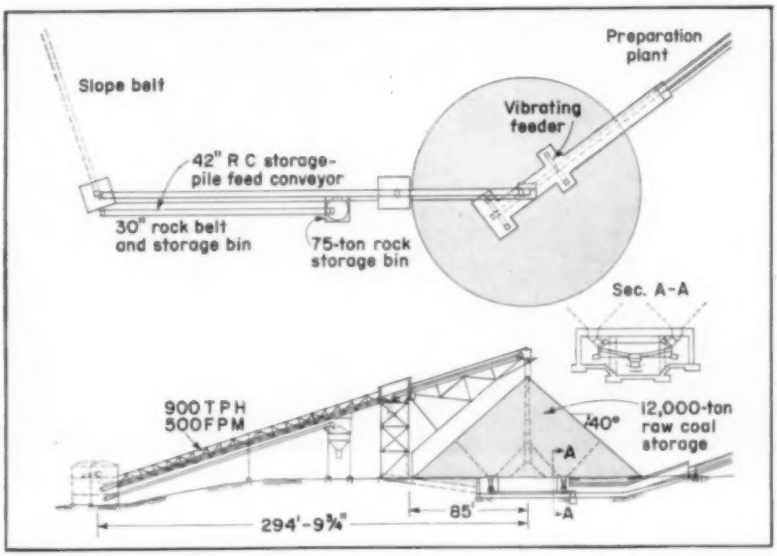


TWIN PILES, one for each of two seams, feature this in-line raw-storage setup with reversible stocking conveyor.

both—in multiple. A radial stacker, for example, could feed to two or more storage sites, each with its own feeder and subway reclaiming unit under the pile. Or trimming conveyors receiving coal from railroad cars may stock to individual piles (say four such units for eight piles) with reclamation by individual feeders and elevating units to a main collecting unit. Various other arrangements of equipment may be employed in all-conveyor storage and reclamation of individual sizes in any reasonable number desired.

Normally, however, as previously noted, the tendency is to install all-conveyor systems for individual sizes. Examples handling mine-run and prepared screenings and resultants include the following:

SLOPE-BELT RECLAMATION—Where a slope belt is employed several mines have utilized it as a reclaiming unit. However such use brings up the question of just how much reclamation is to be done. If coal is stored on a second shift and returned with first-shift coal to the plant to cut the operating time of said plant to a single shift, double the capacity must be provided at some extra cost. This extra cost, in view of the examples already in operation, is considered by those operators to be warranted in view of the other benefits. If the pile is to be used only when mine production is interrupted, however, the problem of increased slope-belt capacity does not come up.



IN-LINE RAW-COAL setup for new mine, with motorized telescopic chute, provides for 12,000 tons of storage in coal-flow route.

Drawings herewith show two arrangements employing slope belts for reclaiming. In one the feedback belt from the plant discharges directly to the hopper over the slope belt. In the other a stacker is employed to increase capacity. Even further increases in capacity are possible by adding a bulldozer, dragline, etc., to move the coal farther out and return it to the hopper.

OPTIONAL-FLOW SYSTEMS—Where mine-run is stored the ground system may be set up to divert coal from the regular flow, store it and return as desired. In other words, storage can be cut in or out. Two such systems are shown in accompanying illustrations. In one, the coal, after being passed through a rotary breaker, is stored in either one or both of two conical piles each over a ground hopper. Feeders under the hoppers put the coal on a return conveyor for delivery to the preparation plant.

Automatic operation of the boom conveyors, including raising and lowering, is provided for by sensing switches on the ends.

The second optional system under discussion involves a ground conveyor to a stacker over a ground hopper

HILLSIDE IN-LINE PILE is made by radial stacker with 15-deg movement. Capacity of the pile is 12,000 tons.

IN-LINE STORAGE for prepared coal with 36,000-ton capacity features traveling stacker and steel-arch reclaiming tunnel.

CANTILEVERED STACKER piling to 69 ft delivers coal to 5,500-ton live storage facility at river property.

and feeder, the latter returning the coal to a second conveyor paralleling the one used for stocking. This and similar arrangements also can be used for laying down a specific prepared coal if desired.

IN-LINE STORAGE—An increasing number of mines are now incorporating raw storage into the coal flow between mine and plant so that it is always present. In addition to always providing the benefits of storage this practice also results in maximum economy in both installation and operating costs.

Five examples of in-line raw-coal storage are summarized in the following. All are shown in accompanying illustrations.

Fixed Stacker—Capacity of the stockpile, in this instance for a new mine, is 12,000 tons. Coal is deposited on it from a fixed feed conveyor or stacker by a motorized telescope chute controlled by a paddle switch to reduce drop. Four vibrating feeders under the pile feed to the belt leading to the preparation plant. [In addition to reducing breakage use of closed telescopic chutes also cuts blowing of fines, not only reducing losses but minimizing the possibility of creating a nuisance.]

Radial Stacker—Capacity of the pile at this property is 3,000 tons. It permits double-shift mining and single-shift tipple operation. Equipping the stacker with wheels permits swinging it in a 30-deg arc and thus increases the capacity of the storage area.

Stacker and Spiral—Serving a strip mine which pioneered the overland belt for haulage, the stacker in this instance is provided with a spiral to reduce breakage in depositing the coal over the ground-level hopper and feeder preceding the plant-feed belt. Capacity is increased by an earth dike.

Twin Stackers—Twin stockpiles with capacities of 5,000 tons each inside an earthen dike receive coal from two seams in this particular installation. A reversible belt and ladders handle the actual deposition of the coal, previously reduced in top size in a rotary breaker. Separate feeder installations permit blending of the two coals as desired before cleaning.

Hillside Pile—Receiving coal from an overland belt from a deep mine, the stockpile at one plant has a capac-

ity of 12,000 tons. It is preceded by a rotary breaker. A radial-type stacker (15-deg travel) is employed. Two feeders underneath the pile move coal to the plant feed conveyor.

PREPARED COAL—In-line storage is less common but still is used for prepared coal, particularly where only one size is stripped. Prepared-coal facilities at the property discussed in the preceding paragraph have a capacity of 36,000 tons. In this instance a long pile is formed by a traveling belt tripper feeding an integral stacker. Underneath the pile is a steel-arch tunnel with six reclaiming hoppers, feeders and collecting belt. Paddle and limit switches and timing relays on the stacker cause it to move, pile and reverse at the end of its travel automatically.

A cantilever stacker used by one property (see illustration) can pile to 69 ft for a live storage of 5,500 tons. Three hoppers and gates feed the coal to a collecting conveyor. Here, as at the preceding operation and at certain others, it is possible to increase the storage capacity by using a bulldozer, scraper or other unit.

Combination Units

As indicated in the preceding material, a fairly common adjunct to the conveyor system for storing and reclaiming is the bulldozer. Other equipment possibilities are front-end loaders either pushing or carrying, standard shovels or draglines, clamshells and so on. Dozers and scrapers can cover more territory, with still more range where the trucks are involved to bring coal back to the plant or to the reclaim-conveyor feed hopper.

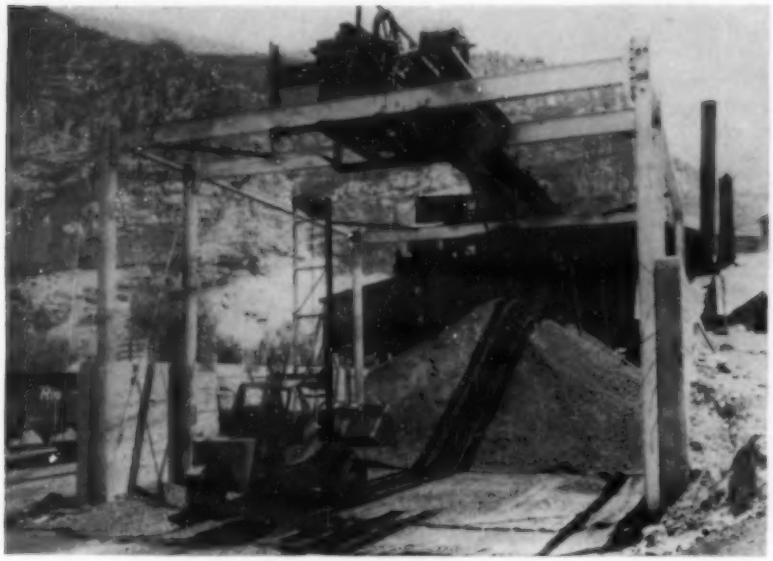
In view of the variety of units that may be used with a conveyor, an equal variety of systems for storage and reclamation of both raw and prepared coal may be set up. Examples include the following:

Fixed Stacker and Dozer—Capacity of the stockpile of prepared coal at one property is 20,000 tons with room for as much as 50,000 tons. A fixed stocking section elevates the coal 46 ft to the pile, where a dozer is employed for spreading. The reclamation tunnel under the pile was made by trenching and lining with timber. Since very little of the coal is smaller than ¼ in, only gates (no feeders) are required to put the coal on the collecting belt.

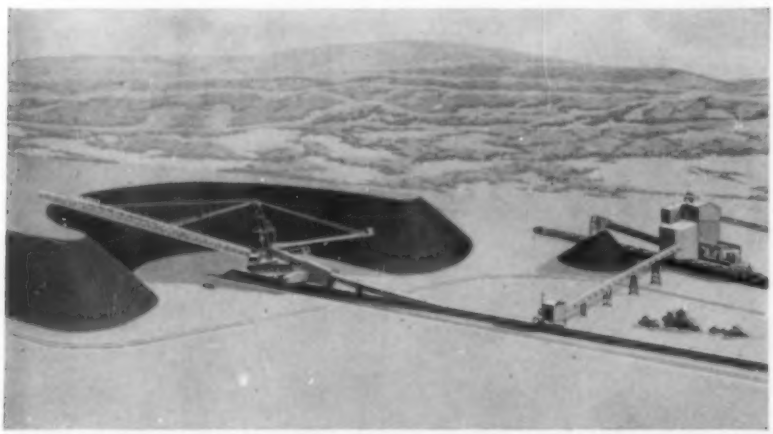
UP TO 50,000 TONS of capacity is provided by this stocking conveyor supplemented by bulldozer.

THROWER on stocking unit at this conveyor-dozer operation puts the coal out as much as 90 ft.

CONVEYOR-TRUCK SETUPS include this one with loading to trucks by rubber-tired elevating conveyors.



DRIVE-IN GROUND-LEVEL BIN with conveyor is served by front-end loader.



KING-SIZED STORAGE FACILITY serves taconite producer. It can accommodate up to 3½ million tons.

More in 1960 . . .

Three more special *Coal Age* Operating Guides are now planned for 1960 in addition to the regular coverage of mining, marketing and related developments in the twelve coming issues, including the *Coal Age* Mining Guidebook. Operating Guide topics and dates are:

Coal Screens and Screening, April, 1960.

Cutter and Drill Bits, September, 1960.

Belt Conveyors and Belting, December, 1960.

What's available, how to use it and how to maintain it for the maximum in results will be the keynotes of these comprehensive and down-to-earth reports featuring the practical approach.

Variations of this system can include the following:

Clamshell to stocking conveyor, with reclamation by same unit plus dozer and conveyors.

Car shakeout, feeder and dozer to stocking conveyor, with reclamation by dozer to bin with feeder and elevating conveyor.

Motor trucks to stocking conveyor with bulldozer and shovel reclamation.

Stacker With Thrower—If barges are not being loaded, coal at one mine (see illustration) can be diverted to a stacker equipped with a thrower which can throw the coal up to 90 ft out. Additional distance and capacity can be obtained with a bulldozer, which also is used to push the coal to the reclaiming belt.

Stackers and Trucks—Two short elevating conveyors (illustration) feed prepared coal to stockpiles at one mine, with reclamation by rubber-tired elevating conveyors and trucks. Many variations of this system are in service, using regular shovels, tractor-mounted units and front-end loaders for reclamation and, in many intances also, in storage.

Ramp Loading—A wire-line scraper is used to store screenings at a mountainside plant, with loading over a ramp to railroad cars by bulldozer. Variations of this system include a bench on a hillside with an apron above to permit trucks to dump down the wall side. Reclamation is done by shovel and truck, but could be by conveyor with the necessary hoppers and feeders.

Drive-In Bin—As an example of the flexibility in arrangements possible with modern equipment, one mine ran an overhead conveyor out over a storage area made by building concrete retaining walls, as shown in an accompanying illustration. The "bin" is open ended and a small rubber-tired front-end loader is employed to transfer the coal to trucks.

King-Sized Storage—Though possibly not yet for coal, the taconite industry provides an example of big storage. As the accompanying drawing shows, a stacker and traveling conveyor on rails lay the pellets down. Up to 3½ million tons can be stored with a 275-ft-radius boom. Reclamation is handled by shovels feeding to railroad cars on the track running alongside the pile, which track is shifted over as the pile is sliced off.

Drillers get "more hole per hour with a REICHdrill" because . . .

ALL-HYDRAULIC TOP-DRIVE MEANS:

1. **Infinitely variable speed** of drill rotation from zero rpm to maximum rated speed of model – permits the right rotational speed for every formation.

2. **Safety torque release** which practically eliminates all chance of drill breakage . . . protects all drive components.

3. **Direct-drive to drill stem** eliminating power loss . . . no complicated transmission to wear or maintain . . . no rotary table.

4. **In and out of the hole faster** because no kelly is required.

5. **Operator can drill up as well as down** should bit become stuck.

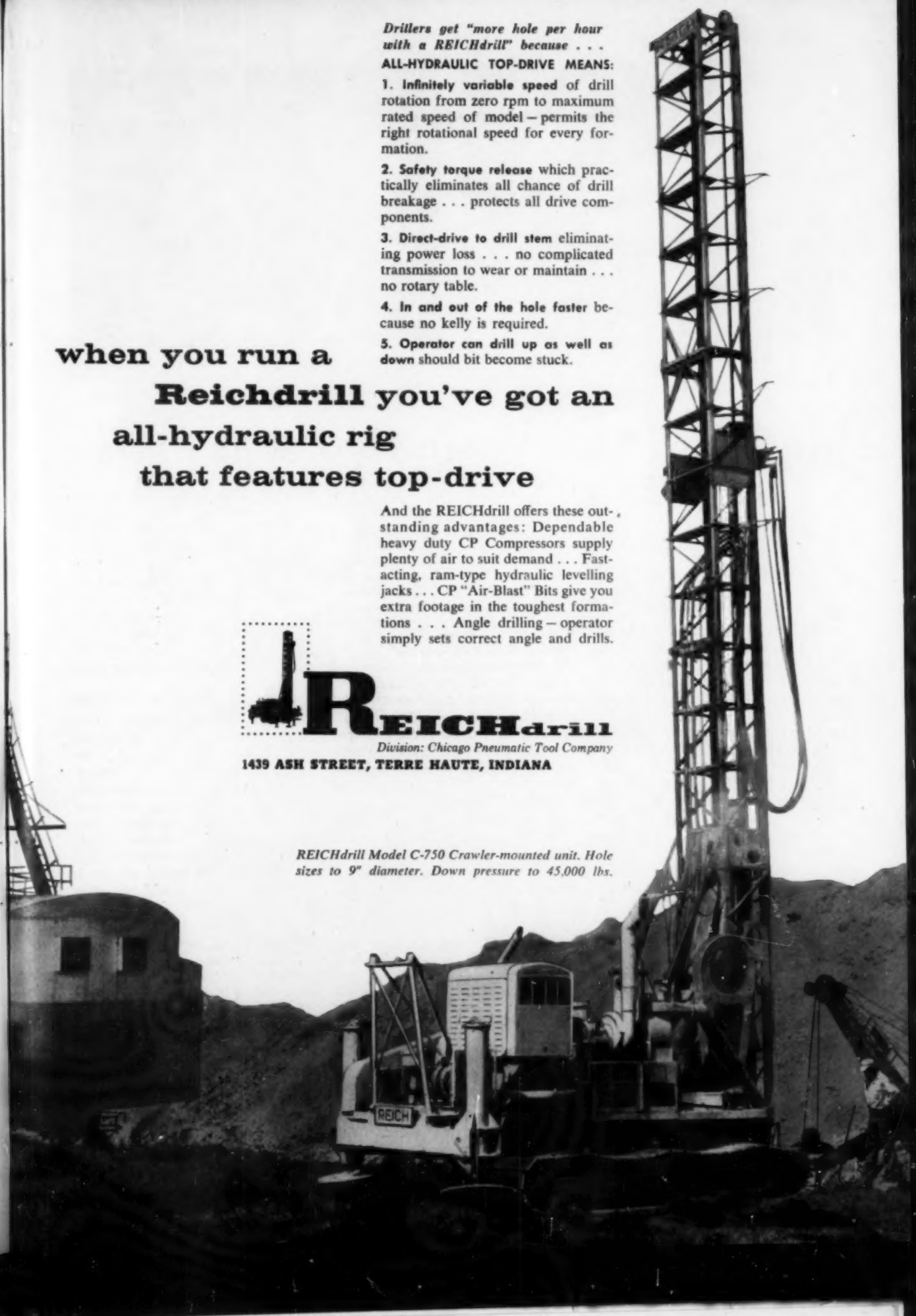
when you run a Reichdrill you've got an all-hydraulic rig that features top-drive

And the REICHdrill offers these outstanding advantages: Dependable heavy duty CP Compressors supply plenty of air to suit demand . . . Fast-acting, ram-type hydraulic levelling jacks . . . CP "Air-Blast" Bits give you extra footage in the toughest formations . . . Angle drilling – operator simply sets correct angle and drills.

REICHdrill

Division: Chicago Pneumatic Tool Company

1439 ASH STREET, TERRE HAUTE, INDIANA



REICHdrill Model C-750 Crawler-mounted unit. Hole sizes to 9" diameter. Down pressure to 45,000 lbs.

FIG. 1—Typical hydraulic components hard surfaced include (top to bottom) piston from cutting machine, jack piston and valve spools. Replacement cost for the piston was cut 60%.

FIG. 2—Directional valve spool is overlaid with hard-surfacing alloy. Buildup in this application is 0.040 in per side or 0.080 in on diameter. The process uses a special spray gun.

Reclaim Those Worn Hydraulic Parts

Application of a new spraying process for reclaiming worn hydraulic components gives management another tool for cutting maintenance costs.

HYDRAULIC EQUIPMENT serves many applications in mining and processing coal. Because of this, an extensive industry has developed around the maintenance of hydraulic mechanisms. One of the largest and most progressive hydraulic rebuilders serving the West Virginia, Pennsylvania, Kentucky and Ohio coal fields is Bradshaw Hydraulic Service, with shops in both Fairmont and Clarksburg, W. Va. Among its services is the reclamation of parts by hard-surfacing with sprayed alloys fused onto the original metal.

Chrome plating was once regarded as the only method available of building up worn surfaces and of providing the dense, hard, smooth surface required for pistons, valve spools, plungers and similar hydraulic components. The method is expensive and frequently impractical. For example, the amount of build-up that can be applied is limited because of the nature of the bond between the chrome overlay and the base metal. Heavy thicknesses (in excess of 0.010 in) are apt to peel off or become separated as a result of contact with corrosive elements. Thick chrome plating also lacks the ductility required for extension-type jacks, pistons and other frequently encountered hydraulic components. The result was that components either had to be reclaimed after a minimum of wear or operated to a point of unacceptable efficiency and scrapped.

Either way, the operator was confronted with the possibility of a substantial maintenance cost to keep his hydraulic equipment in operating condition. If he chose chrome plating he was faced with the prospect of tearing down his equipment sooner than he might feel was necessary as a preventive-maintenance procedure, even though the component often might still be giving marginal performance. If he chose to run the component until it was no longer serviceable he was faced with the high cost of replacing the part with a new one, plus the production losses that might be incurred toward the end when the part was in a low-efficiency condition.

Success With Spraying

Late in 1958 Bradshaw began using the "Sprayweld" process. With this method, parts can wear as much as 0.060 in on a side and still are easily reclaimed. The Sprayweld process produces an overlay that is fusion-bonded to the base metal. It will not flake off in service. The Colmonoy alloys used in powdered form have exceptional wear resistance; they are also resistant to the full range of corrosive elements, from pure acid to pure alkaline, normally encountered in coal-producing operations.

In the past year, Bradshaw reports successful Sprayweld applications on such components as valve spools, pistons, plungers, extensions, and brake-drum interiors used in cutters, loaders, mine car dumpers, roof jacks, drills and other mining equipment (Fig. 1). Many of these would have been scrapped had chrome plating been the only reclamation method available. The Sprayweld process is now preferred in Bradshaw repair work where overlays from 0.010 to 0.060 in thick are required, thus increasing salvage possibilities.

Wear resistance in the Colmonoy overlay is provided by the presence of chromium borides, as well as chromium carbides, bound in a nickel-base matrix. This combination of materials results in unusual friction characteristics. Any carefully ground and highly polished surface will generally have a low coefficient of friction. When put into service, however, normal wear usually brings about an increase in friction. Thus, what at

FIG. 3—Sprayed overlay is fused to base metal of spool using flame of oxyacetylene torch. Rotation prevents distortion.

FIG. 4—Hard-surfaced and ground spool, which had been scrapped, is ready for replacement in directional valve bank.

one time may have been a low-friction surface becomes, in effect, an abrasive surface that can actually contribute to wear and increase the power required to move the component and also lower the efficiency of the system.

The sprayed alloy, on the other hand, not only has a low coefficient of friction following the grinding operation, but also retains its friction-free characteristics as wear occurs. This contributes to reduced power requirements as well as to improved service life for mating hydraulic components.

The wear and corrosion resistance of the hard-surfacing alloy, Bradshaw management has found, gives longer service life than chrome plate in all applications. In addition, reduction in packing gland wear as well as reduction in wear of the packing itself mean less packing-gland maintenance and minimum fluid loss during operation, thus providing savings in the over-all system.

Spray Procedure

Parts to be overlaid by the Sprayweld process are first deplated in a chrome plating tank by reverse process, pickling and degreasing to insure removal of all residual elements that might adversely affect the Sprayweld deposit. Diameters to be overlaid are next undercut a sufficient amount to provide for the desired hard-surfacing overlay thickness. Any scores or pits remaining are filled in with Colmonoy No. 4 rod, applied by oxyacetylene welding.

The undercut surfaces are next grit-blasted, using S.A.E. No. 18 crushed chilled-iron angular grit. This is required to sufficiently roughen the surface to insure a good mechanical bond.

The part is next mounted in a lathe for application of the hard-surfacing alloy. Bradshaw applies Colmonoy No. 5 in powder form, using the Spraywelder unit shown in Fig. 2 where a typical hydraulic valve spool is overlaid. Bradshaw prefers the No. 5 alloy because of its good machinability. The spray pistol is mounted in the lathe's tool post, and the traversing mechanism is utilized to smoothly pass the spray back and forth until the desired build-up is achieved.

With the part still rotating, the mechanically bonded overlay is fused to the base metal using the flame of an oxyacetylene torch (Fig. 3). Rotation of the part prevents distortion during fusing. The fused part is next ground to finished dimensions. It is then ready for reassembly in the mining equipment from which it came—in this case a directional valve bank (Fig. 4).

Fundamentals of Motor-Starter Design

MOTOR PERFORMANCE depends to a large extent on selecting the proper starter for each application. To match motors and their loads with proper starter protection it is necessary to know the why and wherefore of motor-starter design. Knowing the difference between one-, two- and three-step starters will help show why motor starters are used to protect mine motors and also will aid in the selection of starters.

Basically, a starter is designed to limit the starting current to the motor. This is done by placing a resistor in series with the armature to reduce the initial current. As the motor gains speed the resistor is cut out in one, two or more steps until the motor is directly across the line. As their name implies, one-step starters have one step resistance, two-step starter have two steps of resistance, etc. The number of steps is determined by the size of the motor and the nature of its load.

Resistor Calculations

The need for additional resistance in the armature circuit of a motor can best be explained by the following example.

A 10-hp 250-V DC motor rated at approximately 40 amp has an armature resistance of 0.25 ohms. If this motor were to be connected to a 250-V source, the armature current would be approximately 1,000 amp (250 divided by 0.25), using Ohm's Law. With a 40-amp rating the motor would not be able to take this high starting current. The commutator and brushes would flash over.

If you wished to limit the starting current to, say, approximately 150% of rated current the additional resis-

tance can be calculated by Ohm's Law as follows:

Known quantities:
Voltage (V) = 250 V
Current (I) = 150% × 40 = 60 amp
Armature resistance = 0.25 ohms
Unknown quantity:
R_T (total resistance) = R_s (starting resistance) + 0.25 (armature resistance)
Ohm's Law:

$$R_T = \frac{V}{I} \text{ or, } R_s + 0.25 = \frac{250}{60}$$

Then, $R_s = 4.17 - 0.25 = 3.92$ ohms.

Adding a 3.92-ohm resistor to the armature circuit of the 10-hp motor will limit the starting current to approximately 150% of rated current.

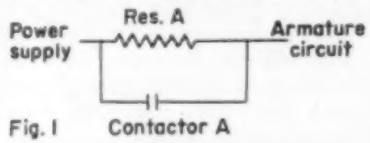


Fig. 1
One-Step Starter

A 15-hp 230-V DC motor may perform satisfactorily with a one-step starter. A diagram of this starter is shown in Fig. 1. Contactor A is open at the time of starting so that the resistor, A, is in series with the armature, thus reducing the incoming voltage. As the motor comes up to speed and as the timing device closes the contactor, the resistor is bridged out of the armature circuit. The motor is then directly across the line. Resistor A limits the starting current to protect the commutator from flashover and to limit the starting torque applied by the motor to the load.

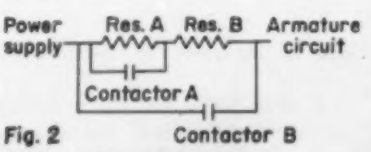
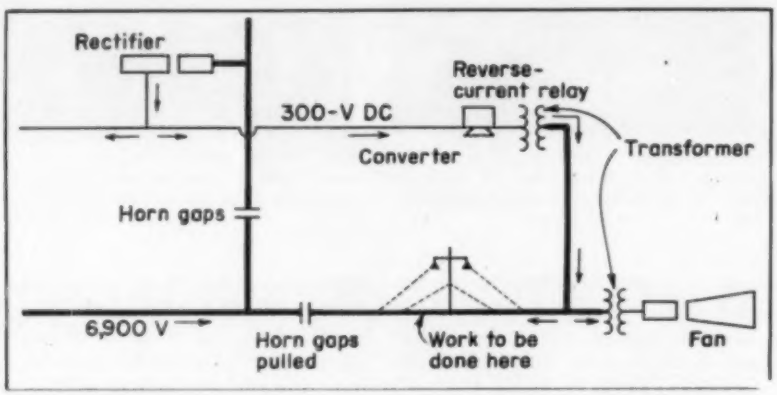


Fig. 2
Two-Step Starter

Where a larger motor is required to do more work, it may be necessary to use a two-step starter for complete protection for both the motor and the load. Fig. 2 shows a two-step starter which operates much the same as the one-step except that as the motor comes up to partial speed Timing Contactor A closes, cutting out Resistor A. As the motor speed increases, Timing Contactor B closes, cutting out Resistor B and the motor is then directly across the line.

The combined resistance of A and B allows the motor to start heavy loads slowly and smoothly without the danger of high torque being applied to the load and without the danger of commutator flashover. Resistor B allows additional current to reach the motor, shortening the entire starting time but still providing the necessary protection.

The same procedure takes place in a three-step starter with a third resistor and a third timing contactor.



Is the Power Really Off?

WHEN MAKING REPAIRS on electrical equipment or power lines it is essential that all safety rules be followed. Even then there is always the possibility that some unusual circumstance may occur, producing a hazardous working condition. Following is an abstract of an article on how two electricians avoided serious injury by conceding to the impossible, which appeared in *The Safe Mine Foreman*, a publication of the accident-prevention division of the Coal Dept., Eastern Gas & Fuel Associates.

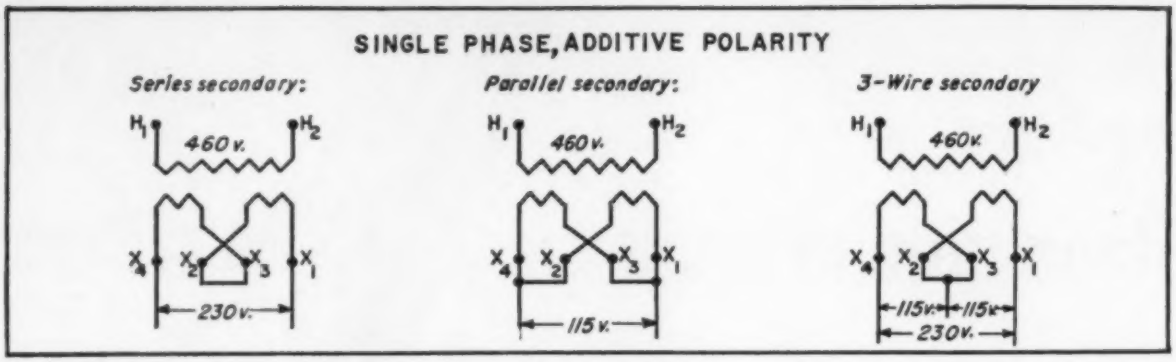
Two men familiar with AC Power planned to make repairs on a 6,900-V power line on top of the mountain. The line crossed the mountain and then divided into two branches, one branch feeding to a rectifier; the other to a 100-hp 440-V fan and rotary converter. Each 6,900-V branch circuit was equipped with horn gaps (see illustration).

Electricians pulled the horn gaps on the branch which needed repairs —the branch with fan and rotary converter—and then proceeded to the top of the mountain. Just before beginning work, one man noted that he heard the fan running. But how could it be with the power disconnected? Just to be safe the men went to check and the fan was running. This indicated that the power line might possibly have 6,900 V on it. Further checking revealed that the rotary converter was also running. When the men pulled the breaker to the converter the fan stopped.

This Is What Happened

The horn gaps in the branch circuit feeding the rectifier were not pulled. DC power was being produced by the rectifier and transmitted to the converter through connecting DC feeder lines. The converter was equipped with a reverse-current relay to prevent power feedback but the relay did not operate because the converter was set at a slightly higher rating than the rectifier.

Power feeding from the rectifier caused the converter to motorize. Power from the motorized converter was fed through the transformer, stepping the voltage up, which in turn passed through the transformer at the fan, causing the fan to run. This also energized the high-voltage line.



Connecting Single-Phase Transformers

Terminal Markings

STANDARD TERMINAL MARKINGS are used in all single-phase transformers to simplify connecting them in banks. Leads brought out of the casings are marked with the letters H or X, H representing the higher voltage and X the lower. Fig. 1 shows the standard for small split-secondary single-phase distribution transformers. This arrangement, with H1 opposite X4, is known as "additive polarity." In addition, all standard transformers have X2 and X3 crossed internally.

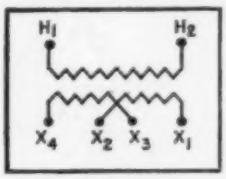


Fig. 1

A continuity test should be made before connecting transformers to determine the correct coil groups if any of the following conditions exist:

1. There is no nameplate or drawing showing the terminal markings.
2. There are no manufacturer's markings on the casing, terminals or leads.
3. The markings consist of letters or numbers other than those shown in Fig. 1.
4. There is any doubt whatsoever about the correct terminal arrangement.

Polarity Test

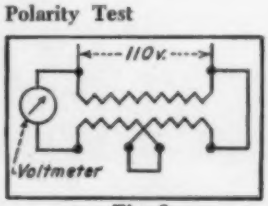


Fig. 2

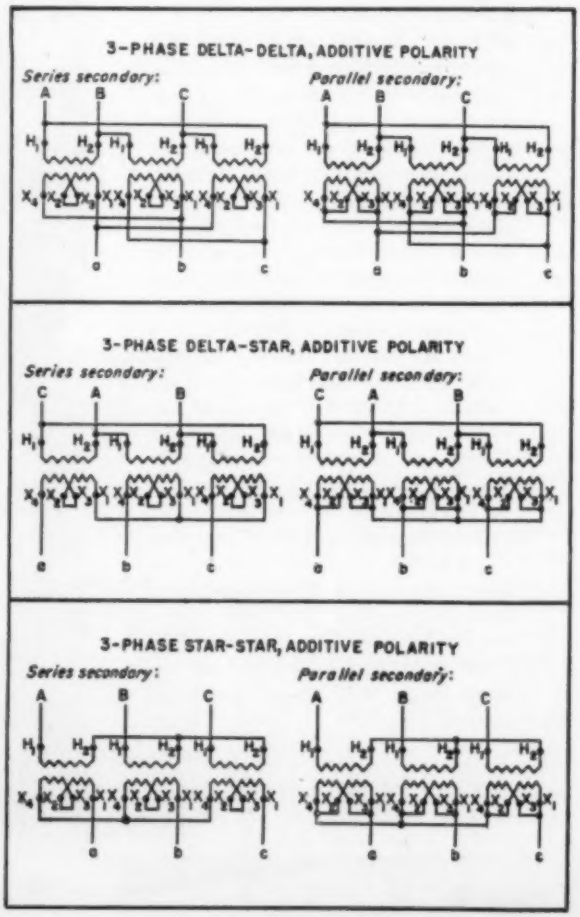
Unlike small distribution additive-polarity transformers, larger power transformers are usually connected with H1 opposite X1. The larger types are known as "subtractive polarity." It may be necessary to determine whether a transformer is additive or subtractive if this information is not known. The following test may be made to determine polarity:

Assume a transformer is to be tested which has a 2-to-1 voltage ratio, low voltage coils in series.

1. Make connections as shown in Fig. 2.
2. Apply 110 V to high-voltage side of transformer.

If meter reads 110 plus 55, or 165 V, polarity is additive.

If meter reads 110 minus 55, or 55 V, polarity is subtractive.



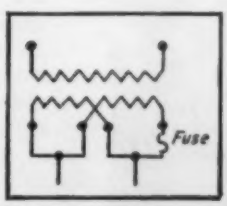
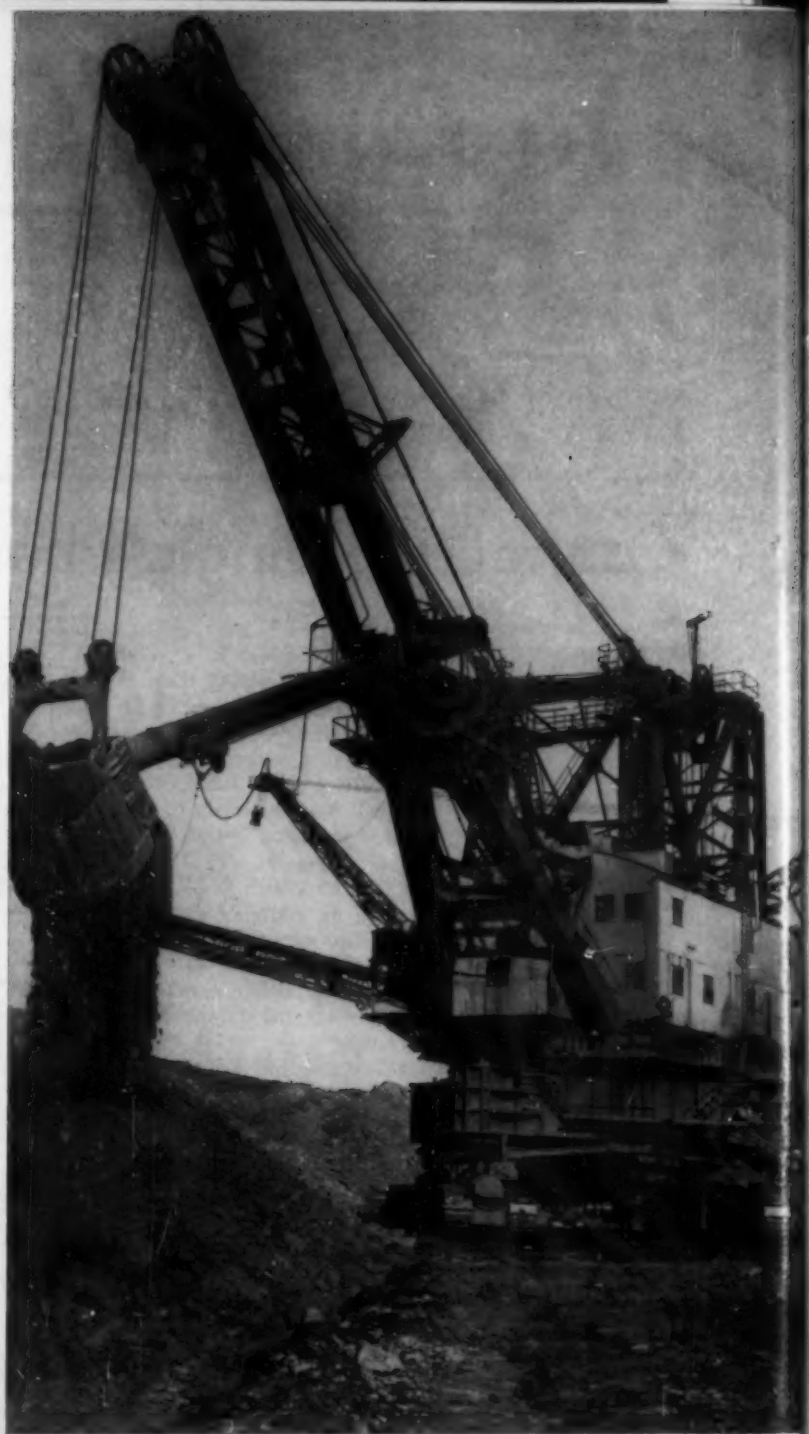


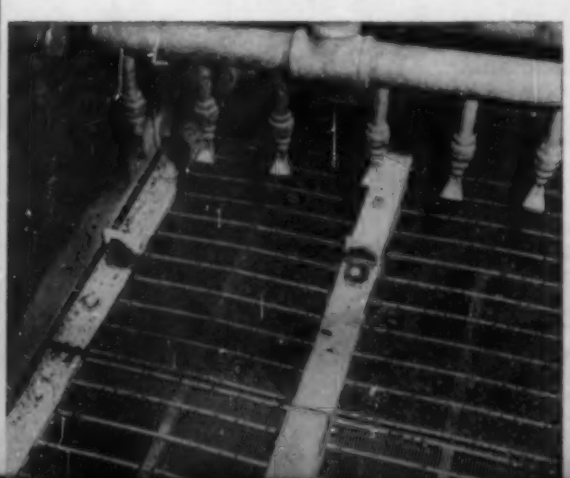
Fig. 3

Final Test

Before connecting the load to the transformer, insert a fuse (as shown in Fig. 3) just large enough to carry the exciting current. If the connection is not correct the fuse will blow.



USS "T-1" Steel dipper weighs 5 tons less, scoops 10% more load. This shovel originally had a 30-cu.-yd. dipper (90,000 pounds capacity) that weighed 57,650 pounds. It was replaced with a 33-cu.-yd. (99,000 pounds capacity) dipper made of USS "T-1" Constructional Alloy Steel that weighs only 46,900 pounds—a clear saving of 10,750 pounds of steel. The new dipper has a capacity gain of 10%, or 9,000 pounds; yet its total weight, including load, is nearly one ton less than the old unit. "T-1" Steel is a natural for dipper and bucket construction. It has tremendous yield strength (100,000 psi min.), weldability and exceptional resistance to impact abrasion. This dipper was built by Bucyrus-Erie for use in the Red Ember Mine of the Truax-Traer Coal Co. near Fiatt, Illinois. Mr. Roy Leseney, Mechanical Superintendent of the mine, says that "T-1" Steel dippers are doing a marvelous job for them. They dig better, handle easier and last much longer than dippers previously used.



Stainless Steel? You can hardly wear it out! That's what John Robinson, Chief Foreman at the Truax-Traer Burning Star Mine says about the USS Stainless Steel used in vibrator screens, liners and chutes. The old iron screens wore out in 6 months but these stainless vibrator screens have been in for 30 months with little signs of wear. Another big advantage is that fine, wet coal doesn't stick on stainless steel. No cleaning at all has been necessary—an obvious saving in time, labor and money.

How Truax-Traer reduces mining costs with USS Special Steels

One sure way to reduce mining costs is to use stronger, brawnier steels that can take pounding, rough handling, and constant abuse. At Truax-Traer mines, USS High-Strength Steels, extra strong "T-1" Constructional Alloy Steel and Stainless Steel are very much in evidence. These special steels are boosting service life, increasing payloads, reducing downtime and saving operating dollars.

Here are the USS Steels that do more —and save more:

USS MAN-TEN Steel—High strength with abrasion resistance and economy. (Minimum yield point 50,000 psi)

USS COR-TEN Steel—High strength with superior atmospheric corrosion resistance and abrasion resistance. (Minimum yield point 50,000 psi)

USS TRI-TEN Steel—High strength with toughness, weldability and abrasion resistance. (Minimum yield point 50,000 psi)

USS "T-1" Steel—Super strength with impact abrasion resistance, weldability and toughness. (Minimum yield strength 100,000 psi)

USS STAINLESS Steel—High resistance to corrosion, elevated temperature and abrasion.

Each of these USS Steels is superior for certain applications. Our metallurgists will help you choose the best steel for your job. Contact our nearest sales office or United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS, COR-TEN, MAN-TEN, TRI-TEN, and "T-1" are registered trademarks

60-ton high-strength steel trailer replaces three 20-ton units. Four of these giant Euclid trailers haul coal between the stripping operations and the tipple at Truax-Traer's Burning Star Mine #1 near Elkville, Illinois. Each one does as much work as three of the 20-ton units previously used—with a big saving in operating costs.

To get maximum capacity with low weight and low maintenance, the designers used two USS High-Strength Steels, COR-TEN and MAN-TEN brands. These steels have great ability to take shock, abrasion and wear and COR-TEN steel offers 4 to 6 times the atmospheric corrosion resistance of carbon steel. The trailers have been in use 6 months and no maintenance has been necessary.

United States Steel Corporation—Pittsburgh
American Steel & Wire—Cleveland
National Tube—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
United States Steel Export Company

United States Steel

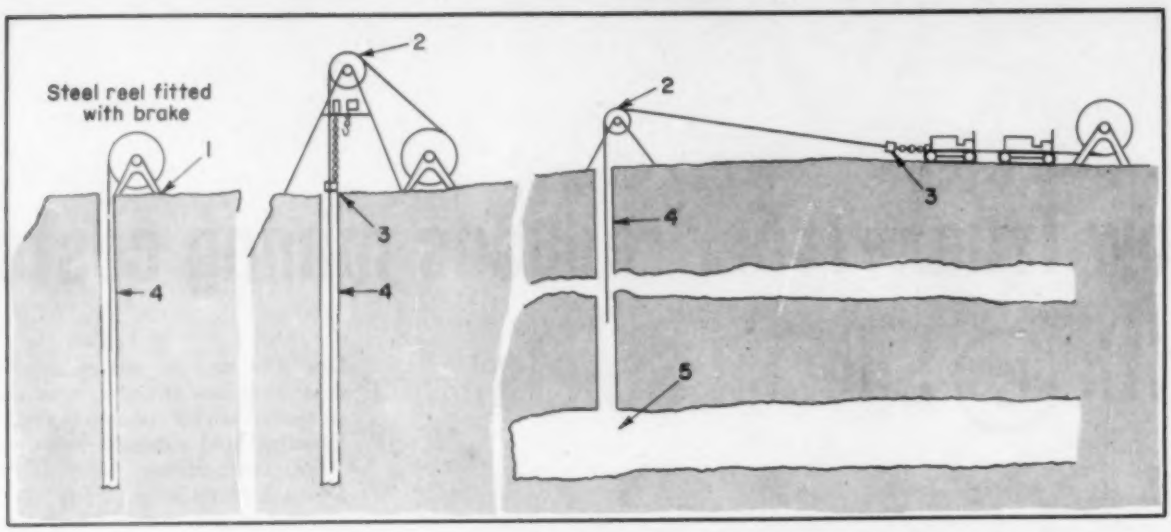


FIG. 6—LOWERING borehole cable from surface

1. Anchor reel platform securely.
2. Use guide sheaves large enough to prevent cable being bent beyond recommended minimum radius.
3. Clamp securely to prevent cable from breaking loose, but do not clamp tight enough to damage cable.
4. Borehole must be perpendicular, straight, free from faults, dry and well made.
5. Keep workmen away from bottom of borehole until after cable is in place and securely anchored. A runaway cable is extremely hazardous.

AC Cables for Coal . . . Installation,

Handling borehole and shaft cables

Selection based upon use

Repairing, splicing, maintaining

F. R. Hugus, Chief Electrical Engineer, Coal Machinery Div., Joy Mfg. Co., Franklin, Pa.

Cable Installation

BOREHOLE AND MINE SHAFT CABLES must be installed with great care because their dependability is so vital to mine operation. Every effort should be made to install them in accordance with the best practices. Unfortunately, however, these cables are installed so infrequently at many mines that mine electricians and engineers seldom acquire much experience along this line. Unless a man has had considerable experience he should secure advice and assistance from the cable manufacturer.

If a borehole is to be used, it must be well made, straight, clean, free from faults, dry, properly cased, located in a spot where it can be isolated from humans and animals, and protected from the entrance of foreign objects.

It should be unnecessary to state that an area must be fenced off at the surface of the borehole to protect humans and animals from electrical shock, thereby avoiding costly law suits on the one hand and, on the other, power interruptions resulting from the body of an animal lying across the wires and burning until the overloads trip or the cable is damaged. Also, provision must be made to prevent the entrance of foreign objects that may damage the cable or become wedged in the borehole and prevent the withdrawal of the cable.

Cables may be installed by being lowered carefully from the surface or drawn up from the bottom. Regardless of the method used every precaution must be taken to keep the cable from breaking loose and falling into the borehole. The few times that this has happened reveal that the cable acts something like a column of water. It flows into the room at the bottom of the borehole and fills it as water would. A workman at the bottom of the borehole probably would be crushed to death before he realized the cable had broken loose.

There has been much discussion as to whether a cable should be lowered from the top or raised from the bottom of a borehole. Both methods are satisfactory though several factors must be evaluated carefully before a decision is made.

Lowering the Cable—If the cable is lowered from the surface, as shown in Fig. 6, it is necessary to provide braking means to prevent it from running away and piling up at the bottom of the hole. Arrangements

---

This is Part II, the final installment of Mr. Hugus' contribution on AC cables. Part I appears in the November, 1959 issue of *Coal Age*, beginning on p 104.

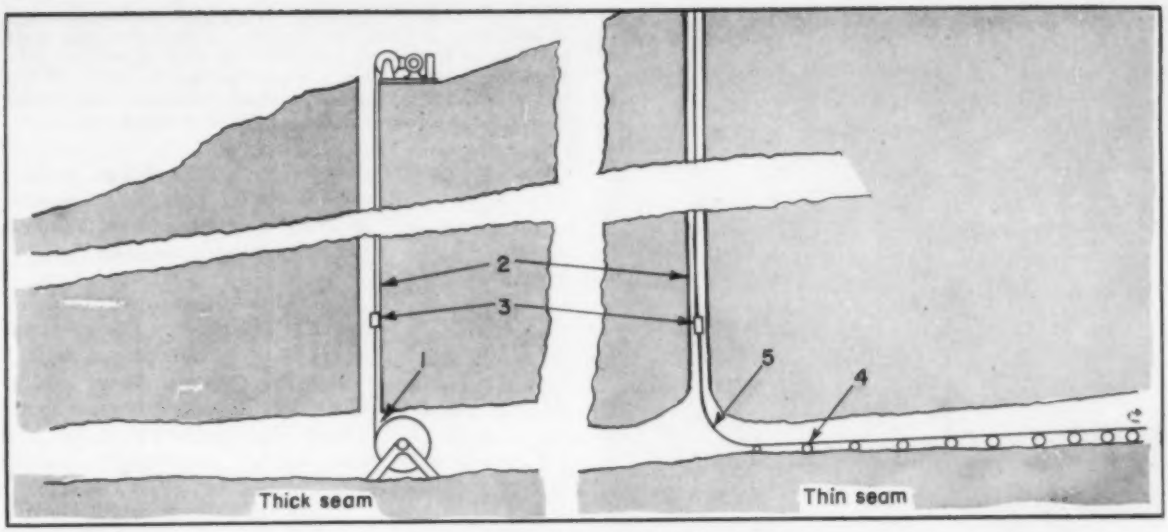


FIG. 7–RAISING borehole cable from bottom

1. Carefully guide cable into borehole to prevent bending cable beyond recommended minimum radius.
2. Borehole must be perpendicular, straight, free from faults, dry and well made.
3. Clamp securely.
4. Provide rollers or other means to prevent dragging cable.
5. Maintain adequate radius.
6. Provide dependable communication between men on surface and men underground.
7. For safety, use minimum number of men at bottom.

Use, Maintenance

can be made with cable manufacturers to have the cable supplied on a reel that can be fitted with a brake. The shaft on which this reel rotates must be securely anchored to prevent the weight of the cable in the hole from pulling the reel over the guide sheave. Also, care must be exercised to prevent the last few turns of the cable from slipping off the drum of the reel, thereby allowing the cable to fall into the hole.

If the cable is not supplied on a reel suitable for braking it should be possible to use two industrial hoists or two tractors to lower the cable. One hoist or tractor can lower the cable until its clamp meets an obstruction. The other hoist or tractor then clamps on the cable and takes up tension so that the first clamp can be removed and an additional length of cable lowered into the borehole. The first clamp can then be placed on the cable in a new position and the procedure repeated until the cable has been lowered satisfactorily. Great care must be exercised to clamp the cable sufficiently to hold it but not tight enough to damage it.

The guide sheave should be of an adequate diameter based on the minimum bending radius for borehole or shaft cable as indicated in Table IV and similar tables. Larger-diameter guide sheaves should be used if these can be secured conveniently.

Pulling Cable Up—If the cable is to be pulled up the borehole (Fig. 7), a problem may be created in getting the cable to the bottom. Borehole cables usually cannot be bent to a small radius, and so they are shipped on reels which may be too large to be handled underground or even to take into the mine. It is then necessary to unreel the cable on the surface and very carefully take it to the proper spot in the mine. Such a procedure is "asking for trouble" because of the many possibilities for damaging the cable. The very fact that the cable weighs between 1.38 to 5.01 lb per foot for No. 6 to 4/0, 3-conductor, makes it difficult to handle when off the reel.

If the coal seam is thin it probably will be necessary to remove some of the mine roof at the bottom of the borehole to provide space for the recommended bending radius. The end of the borehole cable must be securely attached to the hoisting cable and other provisions must be made so that there will be no possible chance for the cable to fall back into the hole, either through equipment breakage or malfunction. It will be necessary for at least one man to be stationed at the bottom of the borehole to guide the cable and otherwise observe progress of the work underground, and his life would be endangered if the cable broke loose. His presence underground also creates the problem of communicating with the men on the surface.

Borehole Depth – The practical depth for a borehole cable usually is determined by its weight per foot and tensile strength. Since all the weight must be supported at the top end the depth of hole is determined by the strength of the cable in tension. Boreholes 300 to 2,500 ft deep are quite common and some are 5,000 ft deep.

In deep mines the cables often are installed in shafts so that they can be supported by being clamped to the sides. Cables often can be installed by placing the reel of cable on the cage, anchoring the end at

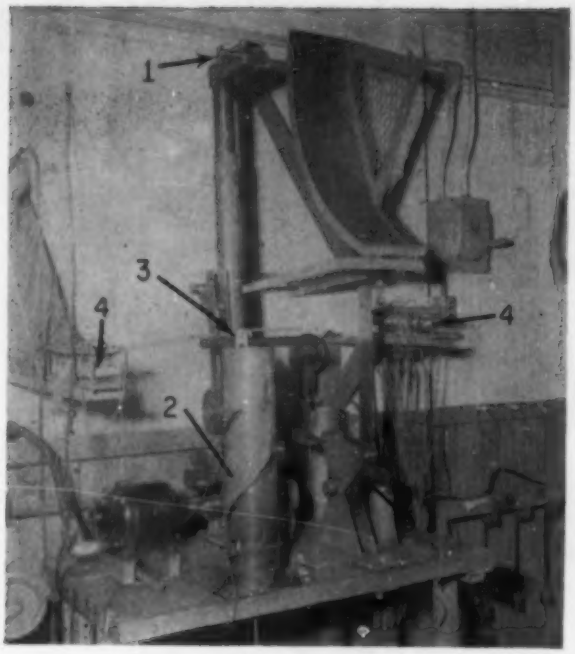


FIG. 8—FRANKFORD ARSENAL bend-test machine (courtesy Simplex Wire & Cable Co.) includes (1) shaft for sheave over which cable is bent, (2) spiral twisting guide (a weight inside forces the cable to twist as it goes through its cycle), (3) top end of weight to which cable is attached, (4) electrical network used to detect cable failures and (5) drive mechanism.

the surface, and unreeling the cable as the cage is lowered. The cage is stopped as required to clamp the cable to the wall of the shaft.

If the reel of cable is too large to be placed on the cage perhaps it can be suspended underneath. If it is too large for this a system similar to that used for lowering borehole cables may be devised. The main point to keep in mind is that the shaft cable should be supported at intervals as it is lowered so that its weight will not pull it apart. Mine shaft cable is designed for clamping at intervals and does not have the tensile strength of borehole cable.

An alternate method is to purchase the cable on reels small enough to be placed on the cage, install it in sections as described above and make one or more splices in it. However, splicing should be avoided if any method is available for installing the cable without splicing.

A useful formula for determining the spacing of cable clamps is:

$$S = \frac{9\,D\,L}{W}$$

Where

- S = distance between clamps in feet.
- D = cable diameter in inches.
- L = clamp length in inches.
- W = weight per foot of cable in pounds.

When it is not possible to clamp the cable according to the spacing indicated by the formula it is wise to use a shorter spacing. Generally speaking the clamps need not be closer together than 25 ft and should not be farther apart than 50 ft. As each clamp is installed the cable should be slacked off to permit each clamp to support only the section of cable immediately beneath it.

The cable clamps should be made, preferably, of an insulating material and should be approximately 8 to 12 in long. They should be made of a material that will not swell in the presence of moisture or deform for any reason. The inside radius of each half of the clamp should be carefully made to fit the cable so that it will clamp it securely, yet not damage it. The clamp should be provided with a generous radius on each end to further insure against damage to the cable.

High-Voltage Distribution Cables

Before any high-voltage distribution cables are purchased and installed local laws and regulations should be studied carefully so that your cable-installation practices will conform with local requirements. Unfortunately different states have different regulations concerning the installation of high voltage cables. Many of the state laws and regulations were written before modern cable-insulating materials, cable-construction practices, and cable-protective devices were developed.

Installation—High-voltage cable installation should be as follows except where state regulations prohibit:

1. Mine power feeder cable should be self-supported on properly spaced insulators or laid on the mine floor in other than track or haulage entries.

2. All high-voltage cables shall be installed in entries on intake air if the mine produces methane. In non-coal mines it may be desirable to install the cables in the exhaust air stream.

3. The last inby length of cable should be Type SH-D and may be laid directly on the mine floor. It is recommended, however, that extra lengths be stored in the form of a large vertical figure-eight on wooden safety posts.

The problem of transporting mine power feeder cable from the surface to the area underground where it is to be installed should be studied carefully. Low seam height or limited transportation facilities may indicate that several short lengths of cable should be purchased instead of one long piece. These shorter lengths can be shipped on smaller reels. They also are lighter and easier to handle underground.

If this appears to be a part of your problem in selecting a cable, you will be wise to discuss it with your cable supplier. Table X lists the approximate reel size and net weight for various lengths and sizes of 5,000-V mine power feeder cables as supplied by a leading manufacturer. These data can be used for a guide to determine if reel size or weight will create a problem in taking the cable into the mine. If a problem is indicated, it should be studied carefully with the manufacturer before the cable is ordered.

Cable Use

The use to which a cable is put must be considered a vital part of

the problem of selecting and installing cables. Careful selection and installation will aid materially in reducing the hazards and deterioration to which a cable is subjected in use.

Cable life may be increased and cable costs reduced by observing the following rules:

1. Excess cable, whether it be high-voltage or low-, should, as already suggested, be stored in a safe place in a large Fig. 8 so that maximum ventilation is provided to remove heat generated in the cable during normal operation.

2. When cable is handled insulated gloves should be worn and insulated cable-handling hooks should be used.

3. Even though cables appear to be of a waterproof construction, every effort should be made to keep the cables away from water holes and water dripping from the roof.

4. Cables should not be buried under timbers, slate, coal or other mineral, or in any manner covered up to prevent the free passage of air over them.

5. Cables should not be tied in knots or bent sharply.

6. Cables should not be kinked or twisted.

7. Cables should not be punctured with nails or other similar sharp objects, and every effort should be made to keep them from resting on sharp rocks or other objects that may pierce their jackets.

8. Cables should not be run over by rubber-tired, crawler-mounted or any other type of vehicle. In fact, men should avoid walking on cables.

9. Cables should not be pulled by a machine.

10. Cables should be examined frequently (once each day is not too often in some mines) and repaired immediately when any damage or fault is found.

11. All repairs should be vulcanized or, in some equally effective manner, sealed mechanically and electrically. Never use friction tape to replace factory insulation in splices. Always use a water-resistant rubber insulating tape.

12. When cables are installed on reels the level wind should be arranged to lay the first turns in the place they desire to occupy and all subsequent turns should be laid on in an easy, natural manner. The level wind should not fight the cable.

13. Slack cable should be reeled up carefully to avoid snapping, whipping or stretching.

14. Cable-reel torque settings should be based on manufacturer's recommendations.

15. Shuttle-car cable-anchor clamps should be fitted with springs to reduce the effects of jerks on the cable.

16. Where possible all cables hould be sectionalized in short length.

17. Cables should be anchored by suitable clamps around the jacket. Anchoring one conductor only causes the cable to twist.

If a cable jacket or cable is damaged in any way it should be renoved immediately and spliced. Several mines that are obliged to follow this practice because of safety requirements report that their cable costs are approximately 50% the cable costs of mines that repair cable only at convenient intervals.

Cable jackets are quite tough and quite resistant to ordinary hazards encountered in mines. However, if the cable jacket has a hole in it this will permit the entrance of moisture and other contaminants, and these will be carried along the cable despite the fact that good cables are designed to guard against this wicking action. These foreign materials search out weak spots in the conductor insulation and gradually, or sometimes quickly, cause a failure in the cable.

Cables on Reels—Since shuttle-car cables have a shorter life than cables on other mining machines it is desirable that every aspect of their use be explored to determine the limitations of using cables on reels and encourage cable use that will increase cable life and decrease cost.

We have discussed the fact that current flowing through cables produces heat. This heat has an opportunity to leave if the cable is stretched out along the rib or stored n a figure-eight so that ventilating air can flow over it. If the cable is wound tightly on a reel very little cooling air can reach it and the inside turns will probably overheat. This excess heat will cause the insulation and jacket to age rapidly, harden and crack. To avoid damaging the cable from overheating from too much current it is recommended that when cables are used with one or more layers wound on a gathering reel the current-carrying capacity should be corrected as follows:

One layer, 0.85 of specified values.
Two layers, 0.65.
Three layers, 0.45.
Four layers, 0.35.

This means that cable rated to carry 100 amp should carry only 85 if one layer is wound on a reel; four layers, 35 amp, etc.

In actual practice, especially on shuttle cars, it is impossible to have a steady current flowing through a cable. In addition the cable is reeled off every time the car travels to the face so that most of the cable has an opportunity to cool normally. Actual experience proves that the intermittent current flow, together with unreeling and reeling, enables the shuttle-car designer to apply the cable successfully without the full de-rating noted above.

Perhaps the best way to judge whether a cable is being used within its safe temperature range is to feel the cable that has not been wound off the reel after the shuttle car has operated at rated capacity for about one-third or one-half a shift. If you can hold your hand firmly against the inside turns of cable you can assume that the cable is not overheating enough to suffer any bad effects. A thermometer can be used. If the temperature of the cable jacket does not read above 60 C or 140 F it may be assumed that the cable is operating at a satisfactory temperature.

Maintenance, Repairs, Splicing

The best way to maintain cables is to avoid damaging them. Supervisors should constantly and continuously educate all warehouse, operating and maintenance personnel in the proper storage, use and repair of cables.

Even though some companies specializing in the maintenance of mining equipment have built up a good business in splicing and repairing trailing cables, the plain truth is that no splicing method is good enough to make the spliced portion the equivalent of the unspliced. Fortunately, however, a skilled conscientious workman can make a practical satisfactory vulcanized splice that will restore several useless short

Table X—Approximate Reel Sizes and Net Weights for Various Lengths of 5-Kv Mine Power Feeder Cables

Cond. Size, AWG or MCM	Approx. Cable OD, In	Approx. Net Wt. of Cable Length, Lb	Reel Size Reqd.	Reel Dimens. Diam, In x Width, In	Approx. Wt, Unlagged Reel, Lb	Approx. Total Wt Reel & Cable, Lb
			1500-Ft Lengths			
6	1.39	2,070	60	60 x 41¼	449	2,519
4	1.50	2,745	60	60 x 41¼	449	3,194
2	1.63	3,285	66	66 x 46	635	3,920
1	1.75	3,720	66	66 x 46	635	4,355
1/0	1.84	4,155	72	72 x 53	1,250	5,405
2/0	1.95	4,815	72	72 x 53	1,250	6,065
3/0	2.06	6,345	72	72 x 53	1,250	7,595
4/0	2.19	6,735	78	78 x 59	1,450	8,185
250	2.41	8,310	78	78 x 59	1,450	9,760
300	2.54	9,480	84	84 x 63	1,650	11,130
350	2.65	10,230	84	84 x 63	1,650	11,880
400	2.75	11,865	84	84 x 63	1,650	13,515
500	2.93	13,590	84	84 x 63	1,650	15,240
			1000-Ft Lengths			
6	1.39	1,380	48R	48 x 31¼	215	1,595
4	1.50	1,830	48W	48 x 37¼	242	2,072
2	1.63	2,190	60	60 x 41¼	449	2,639
1	1.75	2,480	60	60 x 41¼	449	2,929
1/0	1.84	2,770	60	60 x 41¼	449	3,219
2/0	1.95	3,210	60	60 x 41¼	449	3,659
3/0	2.06	4,230	66	66 x 46	635	4,865
4/0	2.19	4,490	66	66 x 46	635	5,125
250	2.41	5,540	72	72 x 53	1,250	6,790
300	2.54	6,320	72	72 x 53	1,250	7,750
350	2.65	6,820	78	78 x 59	1,450	8,270
400	2.75	7,910	78	78 x 59	1,450	9,360
500	2.93	9,060	78	78 x 59	1,450	10,510
			500-Ft Lengths			
6	1.39	690	48R	48 x 31¼	215	905
4	1.50	915	48R	48 x 31¼	215	1,130
2	1.63	1,095	48R	48 x 31¼	215	1,310
1	1.75	1,240	48R	48 x 31¼	215	1,455
1/0	1.84	1,385	48R	48 x 31¼	215	1,600
2/0	1.95	1,605	48W	48 x 37¼	242	1,847
3/0	2.06	2,115	48W	48 x 37¼	242	2,357
4/0	2.19	2,245	60	60 x 41¼	449	2,694
250	2.41	2,770	60	60 x 41¼	449	3,219
300	2.54	3,160	60	60 x 41¼	449	3,609
350	2.65	3,410	60	60 x 41¼	449	3,859
400	2.75	3,955	66	66 x 46	635	4,590
500	2.93	4,530	66	66 x 46	635	5,165
			300-Ft Lengths			
6	1.39	414	36N	36 x 18¼	67	481
4	1.50	549	36N	36 x 18¼	67	616
2	1.63	657	36R	36 x 23¼	78	735
1	1.75	744	48R	48 x 31¼	215	959
1/0	1.84	831	48R	48 x 31¼	215	1,046
2/0	1.95	963	48R	48 x 31¼	215	1,178
3/0	2.06	1,269	48R	48 x 31¼	215	1,484
4/0	2.19	1,347	48R	48 x 31¼	215	1,562
250	2.41	1,662	48R	48 x 31¼	215	1,877
300	2.54	1,896	48W	48 x 37¼	242	2,138
350	2.65	2,046	60	60 x 41¼	449	2,495
400	2.75	2,373	60	60 x 41¼	449	2,822
500	2.93	2,718	60	60 x 41¼	449	3,167

lengths of cable to satisfactory working condition.

It is impossible for a man to learn how to splice cable by reading a book. The book can give him certain recommendations but he must test his splices against new cable to develop the best technique. A good splice can be evaluated on the basis of four rules: (1) breaking strength in tension; (2) bending cycles to failure; (3) resistance of a spliced cable and (4) resistance of electrical insulation.

Splices made by men in the field have revealed that a splice can have a breaking strength almost equal to that of the original conductor when it left the factory. In addition, the electrical resistance of the conductor at the splice can be made equal to the unspliced conductor and the insulation value of the layer of insulation immediately surrounding the conductor and of the neoprene jacket can be made almost as good as the original cable. The major shortcoming of any splice is that it does not have a resistance to bending equal to that of the original conductor. However, this resistance to bending can be made at least 60% that of the original.

To splice cables properly a man should have adequate tools and test facilities. Actually, a skilled workman will develop these tools and test devices as he gains experience. In starting out a man should have the usual hand tools, such as knives, scissors, pliers and other devices to cut cable cleanly and remove jacket and insulation. He should have an arrangement for holding the cables and conductors as they are being spliced so that uniform tension is placed on each conductor in the cable after the splice has been completed. A good cable vulcanizer is absolutely necessary and a refrigerator is valuable for storing insulating materials.

Splice Testing—In addition to these working tools a man must have a way of testing his splices against new unspliced cable. These tools can be quite fancy or they can be rather simple. Perhaps the easiest way of testing a splice in tension is to clamp one end of the spliced conductor so that it hangs in a vertical position and load the other end with weights until the splice parts. By repeating this same operation on a new piece

LOWER DUST COUNT THAN WET DRILLING

VERSATILE S12VT STOPER

is adaptable for hand-held or jumbo-mounted operation. Available with 34" and 52" feed legs — in weights of 92 and 98 lbs.

NEW LX-1 DUST COLLECTOR TANK

never needs emptying — dumps automatically.

with Le Roi S12VT "Dustless" Stopers

This hard-hitting stoper gives you more benefits and eliminates all of the problems and expenses of wet drilling! It delivers 20% harder, faster blows than comparable machines — has a much lower dust-count than wet drilling. Its exclusive dust-collecting system passes cuttings through the chuck housing — *not through the stoper!* Tools work better, last longer. Steel *never* sticks even in soft, wet formations — or in hard strata.

Special aluminum-alloy leg reduces weight, stops corrosion, and cuts maintenance. Controls are on the leg — not on the stoper — for better balance and easier operation.

Get the complete story from your Le Roi distributor. Or write to Le Roi Division, Westinghouse Air Brake Co., Milwaukee 1, Wis.

LE ROI NEWMATIC® AIR TOOLS

PORTABLE AND TRACTAIR AIR COMPRESSORS • STATIONARY AIR COMPRESSORS • AIR TOOLS

Distributed in the Coal Fields by: Acme Machinery Company, Huntington, West Virginia, and Equipment Service Company, Inc., Birmingham, Alabama.

AT-903

of cable a comparison can be made between the strength of the splice and the strength of the cable. The conductors should be clamped uniformly for each test to avoid inaccurate comparisons due to variations in the clamping method. The maximum breaking load will vary from approximately 500 lb for No. 8 to 3 tons for 4/0 single-conductor cable.

A somewhat more elaborate set-up may be required to compare the splice and new cable in bending. The Frankford Arsenal bending test (Fig. 8) is frequently used to evaluate the ability of cables to stand up under bending. A counter to record the number of cycles through which the cable is flexed should be useful in this test.

The resistance of the spliced conductor and an equal length of new conductor can be determined with a Wheatstone bridge, or some similar device, to accurately measure low resistance.

Insulation and jacket resistance may be measured by immersing the sample splice and an unspliced piece of new conductor in a tank of salt water and subjecting them to a high voltage. Since the breakdown voltage of the unspliced conductor may be in the neighborhood of 30,000 it may be desirable to have this type of testing done at a reputable laboratory until you are satisfied that your insulating and vulcanizing techniques are adequate.

Connectors – Splices may be soldered but care must be taken to prevent the solder from flowing along the stranded conductor and creating an unnecessarily long rigid section that will soon break. Several devices are on the market for use in splicing stranded conductors. One of these is a collar compressed around the ends of the conductors being spliced by being deformed in a controlled manner.

Another is the split ring. This is a flat piece of brass or steel coiled in the shape of a spring. The cable ends to be spliced are inserted in each end of the spring-shaped collar and this collar is hammered to decrease its diameter so that it will grip the conductors. The compression-type collar appears to have some advantage over the split ring but any such advantage is so related to the splicing technique used that it is difficult to recommend one or the other.

To secure maximum strength in tension the strands of the two ends of the conductors being spliced should be arranged so that they overlap each other inside the compression collar or the split ring. The splicing joints on the various conductors should be spaced at intervals of approximately 4 to 6 in along the cable to avoid having the splices all pile up in one spot. Of course, it is expected that the ground wires, as well as the power conductors, will be spliced.

After all of the splices are made, each power conductor is insulated, jacketing material is applied over the entire splice, and the assembly is vulcanized in a mold. From time to time sample splices should be made and cut open to reveal whether the insulating material and jacket are maintaining adequate thickness and sealing and curing properly.

Every splice should be given a dielectric test by submerging the entire spliced section of cable in a tub of salt water and applying about 2,000 V on 600-V cable splices.

Various cable manufacturers offer excellent splicing instructions. This information should be secured and studied carefully. In addition arrangements sometimes can be made for skilled workmen to visit the cable factory for approximately a week to learn splicing and vulcanizing techniques that cannot be obtained from books.

Adequate records are a vital part of any maintenance program. Therefore a good record system must be established and used. Written standards for splicing should be formulated and followed. Written records of various tests should be maintained. These will be supplemented by written records of the performance of new and repaired cable. All cables should be given a serial number or identified in some manner so that their performance can be related to the splicing technique used. Thus, any changes in this technique can be evaluated against performance.

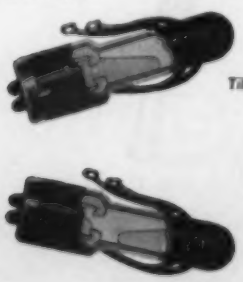
As previously mentioned, however, the best way to maintain cables is to avoid damaging them. Supervisors must educate all personnel in the proper use and storage of cables.

MOST RELIABLE even through fast-cycling, continuous 24-hour schedules.

all steel, mercury

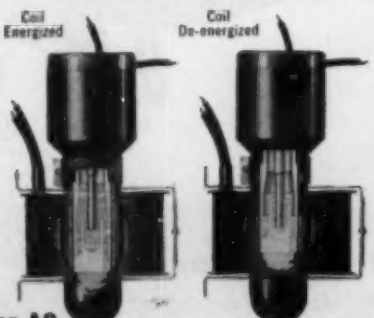
Tilt Switches

Contacts are sealed in hypressure hydrogen gas (50 p.s.i.). Operate under heavy or light loads, including inductive and tungsten. 7 sizes, 1 to 65 amperes.



Timer and Quick Relays

Service and shelf life increased many times former models. Free floating plunger design practically "fail safe." Available in any combination of operate-release time delays from 0.15 sec. to 20 sec.—normally open or closed actions.



DC or AC

All steel (non-breakable) tilt switches and mercury timer and quick relays are built to last the life of your equipment. Destructive heat rise and life shortening erosion from arcing have been eliminated.

For more information write:
4747 Bronx Blvd., New York 70
1969 Avenue Rd., Toronto 12
301 Fifth Ave. So., Minneapolis 15
P. O. Box 1352, Postal Station O, Montreal

Durakool®
ELKHART, INDIANA

Distributed in the Coal Fields by: Acme Machinery Company, Huntington, West Virginia, and Equipment Service Company, Inc., Birmingham, Alabama.
AT-501

NO ABRASIVE CUTTINGS GO THROUGH THIS STOPER!

S20 "DUSTLESS" STOPER is the only practical stoper for 26-inch coal. It's shorter, lighter, more powerful than all other makes — can be used wherever a man can crawl.

LE ROI S20 "DUSTLESS" STOPER

Cuttings are removed through the hollow drill steel and the chuck housing — not through the stoper! That's a big tool- and cost-saving difference between the Le Roi S20 and other makes. And that's one reason why this light, short, and powerful stoper out-drills and outlasts all other makes — why it's preferred by operators.

Its efficient dust-collection lowers dust-count well below that of wet-drilling — permits faster, easier drilling. Since cuttings are kept out of the stoper, it needs less upkeep.

Ask your Le Roi distributor to explain how the S20 "Dustless" Stoper can help you save work and cut costs. For information, write to Le Roi Division, Westinghouse Air Brake Co., Milwaukee 1, Wis.

LE ROI
NEWMATIC®
AIR TOOLS

PORTABLE AND TRACTAIR AIR COMPRESSORS • STATIONARY AIR COMPRESSORS • AIR TOOLS

Distributed in the Coal Fields by: Acme Machinery Company, Huntington, West Virginia, and Equipment Service Company, Inc., Birmingham, Alabama.
AT-501

SAFETY SALES, PILLARING, CABLE MONITORS—L.H. Johnson (left), USBM, and chairman of Coal Mining Section, NSC; A. H. Zeilinger, Colorado Compensation Insurance Fund; George Stachura, Bell & Zoller Coal Co.; George P. Benish, Electrical Products Div., Joy Mfg. Co.

BOLTING, PERSONNEL SELECTION, METHANE DRAINAGE—Mr. Johnson (left); John Zitko, Ireland mine, Hanna Coal Co.; Harry Perry, U.S. Bureau of Mines, and C. G. Evans, personnel manager, North American Coal Corp., Cleveland, Ohio.

Safety in Today's Operations

National Safety Council and cooperating agencies decide to continue industry-wide campaign to prevent roof-fall injuries through the medium of a year-long program in 1960. Goal is 50% reduction in injuries.

THE IMPORTANCE of scientific selection of employees and supervisors, the responsibilities of foremen in selling safety, problems of ventilation with continuous-mining systems, methane drainage, safe coal-recovery methods and new developments in increasing electrical safety underground were subjects receiving top billing at the technical sessions of the Coal Mining Section at the 47th National Safety Congress, Chicago, Oct. 19-21. Attendance at the sessions of the Coal Mining Section broke records, as representatives of management, labor, state and federal agencies, equipment manufacturers and the parent council convened for the annual 3-day program.

A highlight of this year's meetings was the kick-off of the 1960 Campaign to Prevent Roof-Fall Injuries. A planning session of the general committee of the campaign was held on Monday morning, under the chairmanship of Clinton H. Hoch, staff representative of the National Safety Council, and announcement of the crusade was made at the technical sessions. This revived campaign is a followup to the highly successful efforts of 1957-58, when a remarkable reduction in roof-fall injuries was achieved at participating mines.

Officers of the section elected at the business session are:

Chairman—**Joshua Smith**, director of safety, Eastern Gas & Fuel Associates, Mt. Hope, W. Va.

Vice chairmen—**James D. Reilly**, vice president, Hanna Coal Co., Cadiz, Ohio, and **C. F. Herbert**, Bituminous Casualty Corp., Rock Island, Ill.

Secretary—**H. F. Weaver**, chief, Coal Mine Inspection Branch, U. S. Bureau of Mines, Washington, D. C., reelected.

Abstracts of presentations by nine speakers at the technical sessions are as follows:

The Coal-Mine Foreman—A Safety Salesman, by A. H. Zeilinger, Colorado State Compensation Insurance Fund, Denver, Colo.

Progressive management and all other forward looking people have come to know that you can get men to do more than you can make them do. Therefore, today's foreman must recognize that he is a leader and an instructor.

The foreman does not sell merchandise, he sells ideas. However, the principles and processes are the same. Good salesmanship requires that the salesman excite six reactions in the prospective buyer. They are (1) attention, (2) interest, (3) conviction, (4) decision, (5) resolution and (6) action. In making a sale the professional salesman selects the highest motivation of the buyer or the highest appeal of the product and stresses this. A foreman can do the same thing in selling safety. Self-preservation, job pride, family responsibility, competition, earning power are examples of such motivations.

In other fields these results have been achieved:

The cement industry reduced its accidents 87% in 10 yr; the railroads 66% in 6 yr; the steel industry 90% in its years of safety activity. These records were made by intelligent, vigorous, continuous salesmanship.

In coal mining in days gone by we figured on so many lives lost for each million tons produced. During the year before last in Colorado 3 million tons were mined without a fatality. Last year, a mine of the Colorado Fuel & Iron Corp. built a record of approximately 170,000 man-hr of exposure per injury. These are excellent records, accomplished through the safety salesmanship of coal-mine supervisors.

Safety and Economy of the Block Retreat System in Illinois, Including the Training of Workmen, by George Stachura, assistant vice president, Bell & Zoller Coal Co., Johnston City, Ill.

Pillar mining at Orient No. 3 mine was introduced in February, 1952. This was the first mine in Illinois to establish and work successfully a full-retreat system, and the first mine in

BUMPS, CONTINUOUS-MINING VENTILATION—William Norris (left), Olga Coal Co.; John J. Adams, Mountaineer Coal Co.; Robert W. Dalzell, U. S. Bureau of Mines, and Joshua Smith, Eastern Gas & Fuel Associates, chairman-elect of the coal mining section, NSC.

the country to attempt pillar mining with boring-type machines. Pillar mining was new to all employees and supervisors. The entire crew was hand-picked and under the direct supervision of the author during the training period. The first crew was split up to help train men on new crews as they were formed. The men learned pillar mining very quickly, especially the younger men who had very little other mining experience.

In the first attempt at pillar work at Buckhorn mine rooms were blocked out on 72-ft centers. Three rooms were cut into the bleeders before the first pillar extraction began. Two rooms were kept open ahead of the advancing pillar line. Mining was concentrated on one pillar and the pillar was completely removed before the next one was attacked.

At present pillars are mined on one side of the entry and rooms are driven in pairs, leaving only a 4-ft-wide fender between the pair of rooms. Breakthroughs are driven through this fender on 72-ft centers. Center distance between pairs of rooms is 54 ft, leaving a solid pillar between pairs, 40 ft wide and 350 ft long. This solid pillar between room and gob has simplified roof control. Crews have averaged 100 tons per man-shift, as against 50 tons in conventional mining.

The "Lectronic Sentry" for Ground Protection of Cables and Machines, by George P. Benish, manager mining sales, Electrical Products Div., Joy Mfg. Co., St. Louis, Mo.

The "Lectronic Sentry" is a device for use on mobile mining machines to provide complete protection against the electrical faults expected in operations. This is accomplished without a grounding conductor in the trailing cable and includes the complete machine and cable. At present only DC models are available for 250- and 500-V power systems.

The complete Lectronic Sentry includes a small electronic oscillator unit mounted on the machine, a push-button station also mounted on the machine and a receiver unit contained in a Safety Circuit Center at the outby end of the trailing cable at the connection to power. The Safety Circuit Center also includes the customary circuit breaker of adequate capacity for the machine, and is equipped with plugs and receptacles for easy cable attachment.

The oscillator panel, approximately 9x5x2¾ in, in many cases can be mounted within the control compartment of the machine; a separate oscillator enclosure is not then required. For machines where there is insufficient space in the compartment the oscillator panel can be built into an explosion-tested housing that can be installed anywhere on the machine. A separate test button and indicating light is required with each installation. These should be mounted close to the machine controls.

Components such as resistors, relays, switches, which are familiar to the mine electrician, are readily accessible for servicing. Electronic circuits are in plug-in units.

In normal operation the oscillator provides a signal through the cable to the receiver. A fault interrupts the signal, causing the receiver relays to open the circuit breaker in the Safety Circuit Center at the outby end of the trailing cable.

Recent Developments in Dust Collecting in Drilling for Roof Bolting, by John Zitko, superintendent, Ireland mine, Hanna Coal Co., Moundsville, W. Va.

An improved working environment through reduction of dust was the goal of Ireland officials in adopting the new "Through-Steel" dust-collecting system developed by Mine Safety Appliances Co., a system admittedly still in its infancy.

There is a time element involved as concerns the efficiency of the dust collector in relation to the speed of penetration of the roof drill. Using standard scroll augers a hole could be drilled and a bolt installed in 2 min 38 sec. With "through steel" collection of dust the time required is 3 min 7 sec. A continuous miner cuts an entry to specified width of 14 ft in 3 min, thus "satellite" bolting must meet this time limit.

The slower rate of penetration using through-steel collecting methods may result from (1) insufficient volume of air being pulled through auger or (2) friction between the auger and the inside of the hole. Present experiments are being conducted with (1) different blower circuits, (2) different size blowers at varying speeds, (3) various auger bit-end designs, (4) smaller diameter drill steel, (5) drilling the hole deeper with the starting bit and (6) redesign of the filtering unit to decrease its resistance.

The basic problem is the roof rock which is streaked with copper rock and soft shale. Average penetration when these streaks are not encountered is 0.9 in per sec. In the softer rock penetration increase to 2-3 in per sec, causing drill-steel plugging and a consequent shutdown. When this problem is solved, the system will indeed be a great advancement in improving the working atmosphere.

A Neglected Tool for a Successful Safety Program, by C. G. Evans, personnel manager, North American Coal Corp., Cleveland, Ohio.

First, I think we need to look at what the psychologists and other experts have found out about accidents and their causes. Then you will see why we have placed so much emphasis upon selection as one means of improving our safety record.

One factor of great significance has emerged. That is, we need to consider the total individual and his overall attitude toward life and his job in particular if we are to get anywhere in improving the use of our fine technical developments for reducing accidents. Evidence has now accumulated to show that workers who are "solid citizens" in both personal and job adjustment are less likely to have accidents than those who are not. In short, all things being equal in working conditions, the most reliable, productive employee will make fewer "bad moves" on the jobs and, hence, be less likely to incur an accident.

The North American Coal Corp. developed standard selection procedures in 1953. Using tests, interviews and biographical forms, we now do a much more thorough job of evaluating and placing people at all levels of our organization. At the hourly level we use the following procedures:

1. The use of the application as a biographical report is, in effect, a test in itself.

2. An interview is used by the superintendent and personnel manager at the local level whereby they attempt to establish answers to three things—general background, educational and technical background and work history.

3. The Minnesota Paper Form Board Test is given. We do not use any extensive tests at this level because we feel that the job of upgrading must come from the top down, not from the bottom up. The Minnesota Paper Form Board Test is a good screening for I.Q. for spacial relations which means how the individual being tested can visualize activity in his head which would be related to blueprint reading, trouble shooting on electrical or mechanical equipment and a visual conception within his mind of any given situation around a mine.

4. Committee type of selection is used to pick the applicant. However, the superintendent may over-rule, and his findings are final.

5. We then use the physical examination by the doctor as one of the requirements for screening purposes. This includes back and lung x-rays where facilities are available.

6. None of the above procedures applies to people who are returning from a panel of hourly employees.

Our procedure for salaried people from the lowest level up to the superintendent is as follows:

We use the application form in exactly the same manner as with hourly employees.

The tests, however, are different. For clerical help we use the Classification Test developed by Western Reserve University for general intelligence. Also, the same organization developed a test known as Numbers Comparison to determine accuracy in clerical work as well as speed. In some cases, depending upon the job, we also give the Minnesota Paper Form Board Test. For supervisors in any department we use the Minnesota Paper Form Board Test for the same reason that we use this test with the hourly employees. However, the grade which they must receive (or they will not be considered for the position of supervisor) is higher than that for hourly employees. Again, this norm is established by our testing program.

We give the Army General Classification Test for general intelligence, and the Personnel Research Classification Test as a check.

We give a test known as "How Supervise" to check their general knowledge of labor relations. The Purdue Mechanical Aptitude Test is used to determine their mechanical aptitude. An interview is held with salaried personnel by using a manual, if necessary, to determine the overall attitudes and life patterns.

Committee type selection is again used, but in the case of supervisors the General Manager is the deciding factor in case of disagreement between the personnel department and the local supervisory group.

Degasification of Coalbeds in Advance of Mining, by William T. Boyd, mining engineer, and Harry Perry, chief, Branch of Bituminous Coal Research, USBM, Washington, D. C. (Presented by Mr. Perry).

The physical conditions of the coalbeds and associated strata, along with the mining methods used in gaseous areas of the United States, differ from those in other countries, particularly in Europe. Consequently, many of the degasification techniques developed in Europe may have little or no application to our conditions. Therefore, both field and laboratory studies must be conducted to determine new or revised techniques applicable to our mining conditions. Future investigations on degasification of coal mines will be made to obtain answers to these questions: (1) How methane is sorbed by coal, (2) sorption capacity of different coals, (3) how methane can be released readily, (4) its rate of movement along and across bedding planes, (5) how and in what quantities it can be recovered, and (6) how can it be utilized.

The Bureau of Mines presently is planning a field investigation to determine (1) whether methane flows readily along the bedding planes, (2) whether it moves vertically through the coalbed, (3) its rate of movement along and across the bedding planes, and (4) whether water or some other substance can be used economically to displace methane from the coal bed.

Two successive steps are probably involved in determining the amount of CH_4 released in coal mines. The first is concerned with the amount of methane that can be sorbed by the coal and its rate of release. The second is concerned with the rate that the released methane can flow through the coalbed or adjacent strata to the coal face or ribs to be released to the ventilating air. Regarding the first step, a knowledge of the physics and chemistry of the adsorption, and the retention and desorption of methane on coal would be of great value. The rate at which methane is sorbed or desorbed, the amount that can be retained per unit volume of coal, the energy with which the methane is bonded to the coal, and the rate of diffusion of methane through a coalbed are subject to a number of variables. Some of these can be investigated more rapidly and cheaper and under better controlled conditions in the laboratory than under actual mining conditions.

At present, most methane-emission problems in coal mines of the United States can be solved by enlarging the number and size of ventilation entries and increasing air velocity and capacity. However, even these corrective measures have economic and safety limitations. As the more accessible coalbeds become exhausted and a large percentage of our coal production must be obtained from deeper coalbeds, methane emission probably will become a major problem. With smaller working places and larger coal pillars needed because of the heavier overburden, the rate of air flow would have to be increased for proper ventilation. However, velocity will have to be limited to avoid picking up large quantities of coal dust. Even now the mining industry is hampered by high concentrations of methane near continuous mining machines, because ventilation at the face is poor by conventional means. Auxiliary fans on mining equipment or outby the face, with tubing into the face area are being used, but undoubtedly the number of continuous mining machines will increase, and face ventilation will become an acute problem. The coal industry will have a choice of two methods for removing the gas: (1) Degasification before and during mining by a combination of European techniques or by development of some new method more suitable to our mining conditions; or (2) developing more ventilating entries in thin coalbeds to provide better ventilation. However, as a large percentage of the working time would be consumed by tramming mining machines between working places, this latter approach has serious economic limitations.

Pillaring Operations With Continuous Miners Under Bumping Conditions, by William Norris Jr., safety director, Olga Coal Co., Coalwood, W. Va.

The Olga Coal Co. operates two mines in the Pocahontas No. 4 Seam in the extreme southern portion of West Virginia. The terrain is mountainous and the depth of cover over the Pocahontas No. 4 seam varies from about 600 ft in the valleys to approximately 1,600 ft under the highest ridges.

The seam varies in thickness from about 5 ft to more than 8 ft with an average of about 6½ ft. The coal is soft and friable and the ribs tend to crush and spall off under the pressure of the overburden. The bottom may be classified as a hard fireclay which is not affected by water but which in some areas will break even in advance workings and may heave badly during pillaring operations. The main roof is generally a hard massive sandstone which in some areas is replaced by a laminated sandstone with thin coal partings which is difficult to support.

The pillar line formerly was pulled on approximately a 45-deg angle and at full extent was around 2,000 ft long. With hand loading and later with track mounted machines it was possible to maintain a fairly straight pillar line by shifting men

or adjusting the territory allotted to a machine. A high percentage of recovery was obtained and bumps were practically unknown.

However, trouble arose when we began to extract the chain and barrier pillars which had been left between previously robbed-out areas. We soon found that any irregular or oversize blocks ahead of the pillar line were potentially dangerous and subject to bumping. Many of these irregular blocks were present in the form of long seal pillars between main intake and main return airways which had been left to reduce the number of stoppings required to conduct the ventilation to the face areas. By splitting these oversize blocks well in advance of the pillar line we were able to avoid trouble in most cases but in some areas this did not entirely solve the problem. The present method of developing and extracting the barrier and chain pillars, with a ripper-type continuous miner is a radical departure from past practice. Instead of developing the barrier pillars a considerable distance ahead of the pillar line, as was previously done, these barrier pillars are now split only as needed for mining. Development is done by driving into the barrier block in a direction away from the pillar line although this is not always possible due to roof falls in the old entries. By keeping a very minimum of development ahead of the pillar line, the remaining solid part of the barrier block is closer to the pillar line and, as a result, acts as an abutment to support the overlying strata and prevent overloading of the developed blocks being mined.

The barrier pillars to the right and left and the chain pillar in the center, are extracted as nearly as possible in a straight line across the section to avoid converging zones of pressure such as might be set up in a "V" shaped line.

Face Ventilation and Dust Control With Borer-Type Continuous Miners, by John J. Adams, industrial engineer, Mountaineer Coal Co., Fairmont, W. Va.

The trend toward continuous mining is obvious. Coupled with this trend is the increased face ventilation problem resulting from faster penetration in a single work place in coal seams liberating great volumes of methane. The old system of ventilation with line brattice is not going to be satisfactory.

In view of the experiments conducted by our company during the past two years, auxiliary fans do point a way to a method of providing a substantially improved face ventilation system. Included among the trials are the following:

A 1½ hp, 12-in diameter blowing type fan capable of producing 2,600 cfm was installed on the intake air side. Tubing 12 in in diameter was extended a distance of 100 ft along the roof to the rear of the machine. Even with the end of the tubing as much as 35 ft from the face there was sufficient fresh air to keep the face cleared with methane liberating at 20 cfm. Greater liberations than 20 cfm would require larger fan and tubing capacities.

The primary objection to this system was the dispersal of dust in the working area. Also detrimental was the methane buildup that would occur outby the machine. Liberations from the roof and ribs could not be properly diluted since there was no leakage from the tubing to provide additional air flow as compared to the usual leakage associated with line brattice.

A combination system using both the blower and exhuast fans did an excellent job of maintaining a safe atmosphere at the face. However, the difference between the exhaust and blower fan capacities was the only portion of the total air that traveled from the mouth of the working place and inby. This relatively low velocity air caused methane to stratify near the roof at the rear of the miner where it was detected before it could be found at the face. In addition to the inherent disadvantages of the blower system already cited, this system of two sets of tubing on separate sides of the work place further complicated congestion.

Incorporated over a year ago was a blower-exhaust combination which proved to be more efficient and effective than any other method of face ventilation. This system, which is used currently, has the desired diluting and sweeping characteristics of a blower fan and the dust control features of an exhausting system.

A small 10¾-in, hydraulically driven, centrifugal fan, which operates off the miner's hydraulic circuit, is mounted directly on the machine. The fan will force air at about 650 cfm out the end of a 6-in diameter tubing at a velocity of 3,250 fpm This blast of air is sufficient to provide air flow in the far corner and force it into the larger volume circulated by the exhaust fan. It should be observed that the end of the exhaust tubing is maintained inby the blower fan inlet at all times.

At times of methane liberations ranging from 40 to 80 cfm the installation of two fans and two sets of tubing is necessary. In this case, one tubing line is extended to the immediate face, while the extreme end of the second is located within the area between the miner and pickup loader. That area is the point of potential stratification when the methane content is such that a single exhausting unit is not adequate.

A water-injected dust collector was mounted in the "throat" of the continuous miner in an effort not only to eliminate "float" dust in return airways, but to provide face ventilation as well.

The elimination of "float" dust was successfully accomplished. However, the unit was not nearly as effective in removing methane and dust-laden air from either the right or left corner as it was throughout the central region. The mechanics of providing three separate intakes could be accomplished by supplementing the present intake in the center area with one in each corner.

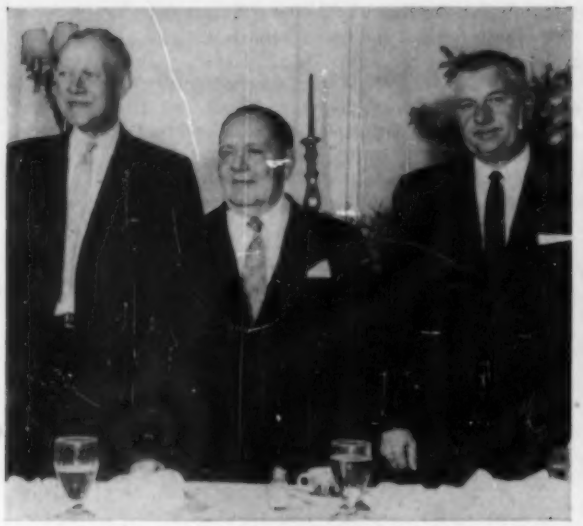
Presently available is a dust collector which can be located at the first crosscut outby the face. It weighs about 1,600 lb and can be either skid- or rubber-tire mounted. The unit consists of a dust collector and reject water pump with a common drive motor. The solids-laden reject water (2 to 4 gpm) can be pumped to the face area and discharged either as spray water or into the stocked coal behind the miner.

Ventilation Problems and Possible Corrective Measures in Operating Continuous Mining Machines in Low Coal Seams, by R. W. Dalzell, mining health and safety engineer, and D. S. Kingery, acting research director, Health and Safety Research and Testing Center, U. S. Bureau of Mines, Pittsburgh, Pa.

Recent tests demonstrate the feasibility of utilizing a diffuser-assisted line brattice for ventilation of full face continuous mining equipment. This installation is most effective when operated with the diffuser discharging through an elbow, directly across the face.

It must be recognized that with the limited air space provided by clearance above and along the miner it will be very difficult to supply sufficient air to the face by any means to reduce the methane concentrations in advance of and by the miner head to the desired 1%. These tests show that it is possible, with the diffuser-assisted line brattice, to reduce the methane concentrations outby the miner head to maximum percentages of around 2% for face liberations to 15 cfm methane. They also indicate that this method, with the proper ratio of line brattice discharge and diffuser capacity, may be used to further reduce methane concentrations and control higher liberations of methane.

The tests were conducted under conditions simulating the sump cut of a full face continuous mining machine with the line brattice maintained a reasonable distance of 4 ft behind the tail of the machine. Obviously, in areas of multiple lift mining, the intake of the diffuser must be maintained on the intake side of the curtain to prevent recirculation as the machine cuts the second and successive lifts. This may be accomplished through the use of noncollapsible tubing extended between the diffuser intake and the line brattice. Under these conditions, line brattice discharge would be maintained as close to the face as feasible.



CENTRAL PENNSYLVANIA OFFICERS—R. T. Laing (left), secretary, treasurer and executive director; George E. Owen, Imperial Coal Corp., president; R. T. Todhunter Jr., Barnes & Tucker Co., vice president.

CENTRAL PENNSYLVANIA SPEAKERS—Dr. Paul L. Brown (left), American Coal Sales Association; J. R. Forsythe, Keystone Coal Buyers Manual, McGraw-Hill Publishing Co.; Carroll F. Hardy, Bituminous Coal Institute.

Coal Prospects and Marketing Central Pennsylvania Themes

GEORGE E. OWEN, president, Imperial Coal Corp., New York, was again chosen president of the Central Pennsylvania Coal Producers Association and the Eastern Bituminous Coal Association at the annual meeting Oct. 22 at Bedford Springs Hotel, Bedford, Pa., featured by "An Optimistic Survey of the Coal Industry, 1959-60," by J. R. Forsythe, general manager, *Keystone Coal Buyers Manual*, and a discussion of the BCI marketing program and its accomplishments to date, by Carroll F. Hardy, managing director, Washington.

Dr. Paul L. Brown, director of training and education, American Coal Sales Association, was the speaker of the evening at the annual banquet, choosing as his topic "You're the Boss," a discussion of management fundamentals and techniques. Special guests included F. Stillman Elfred, chairman of the board, Peabody Coal Co. and National Coal Association, and R. L. Ireland, Hanna Coal Co., who urged cooperation to make the new NCA-industry organization yield the maximum in benefits.

Directors were elected as follows:

Central Pennsylvania Coal Producers Association

T. L. Aitken, Pennsylvania Coal & Coke Div., Fairbanks Whitney Corp.

Otis Bennett, Conemaugh Mining Co.

Heath S. Clark, Rochester & Pittsburgh Coal Co.

A. H. Collins, Collins Fuel Co.

A. B. Crichton Jr., Crichton Coal & Coke Co.

Clarence A. Dobson, Allegheny River Mining Co.

John Emerick Jr., Cambria Clearfield Mining Co.

H. John Harper, Eastern Gas & Fuel Associates.

Donald E. Hartman, Pennsylvania Coal & Coke Div., Fairbanks Whitney Corp.

Dennis J. Keenan, Sterling Coal Co.

John W. Krous, Imperial Coal Corp.

John K. McCarthy, The Morrisdale Coal Mining Co.

T. F. McCarthy, Clearfield Bituminous Coal Corp.

W. J. B. Mayo, Eastern Gas & Fuel Associates.

Ralph E. Moore, Rich Hill Coal Mining Corp.

George E. Owen, Imperial Coal Corp.

Harold K. Powell, Powell Coal Co.

W. H. Ritter, Reitz Coal Co.

Robert H. Seese, The Berwind-White Coal Mining Co.

Joseph E. Smith, Cambria Clearfield Coal Co.

R. T. Todhunter Jr., Barnes & Tucker Co.

Eastern Bituminous Coal Association

Charles G. Berwind, The Berwind-White Coal Mining Co.

Heath S. Clark, Rochester & Pittsburgh Coal Co.

C. F. Clement Jr., Rich Hill Coal Mining Co.

Matthew A. Crawford, Allegheny River Mining Co.

M. Albert Evans, Pine Township Coal Co.

Sam Light, Coal Mining Co. of Graceton, Inc.

J. W. McGinn, Sterling Coal Co.

John Barnes Mull, Barnes & Tucker Co.

George E. Owen, Imperial Coal Corp.

W. H. Ritter, Reitz Coal Co.

Robert H. Seese, The Berwind-White Coal Mining Co.

R. T. Todhunter Jr., Barnes & Tucker Co.

R. S. Walker, Bradford Coal Co.

R. W. Wigton, The Morrisdale Coal Mining Co.

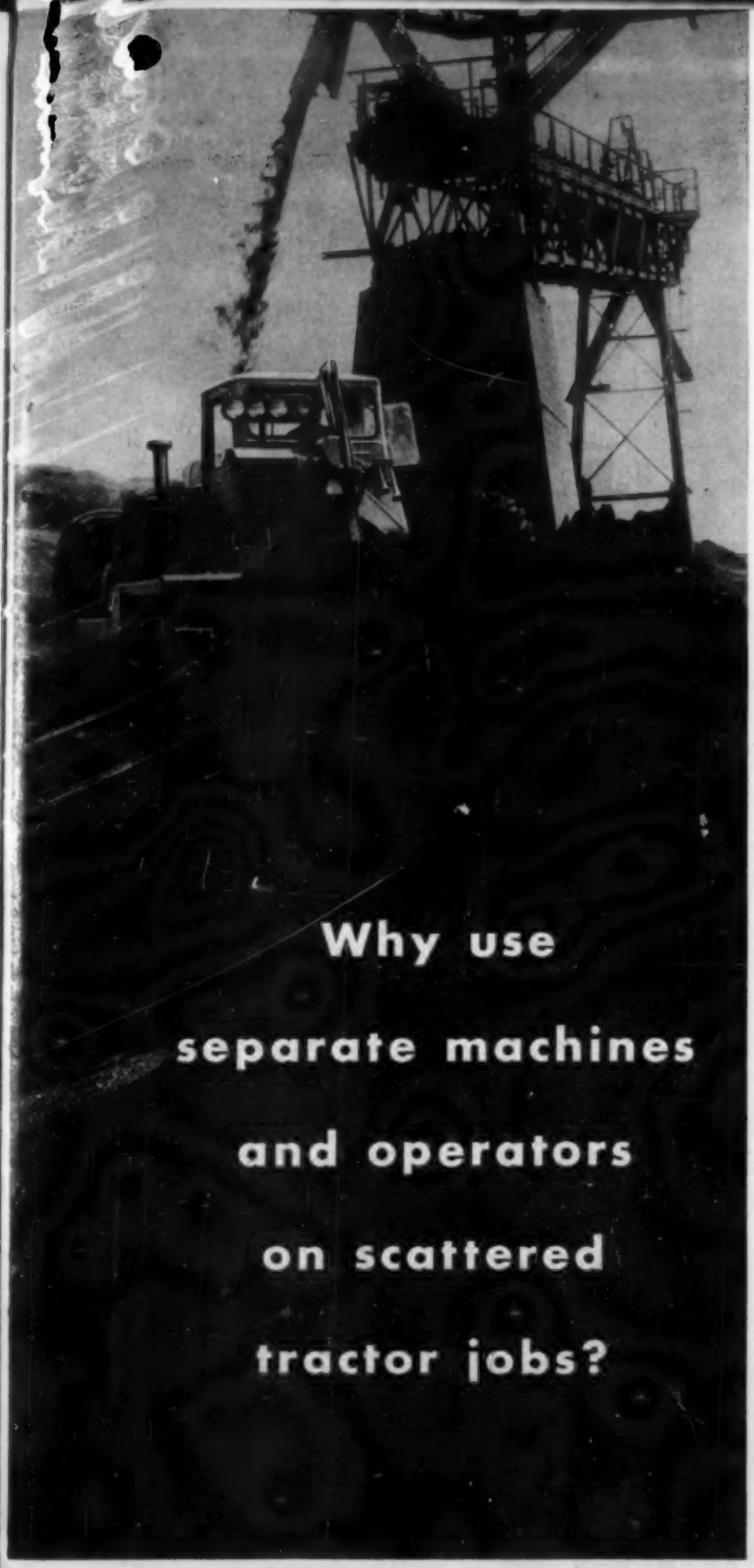
Harold D. Woolridge, Woolridge Coal Co.

In addition to Mr. Owens, the new directors elected Messrs. Todhunter and Seese vice presidents and other officers as follows:

Secretary-Treasurer—Robert T. Laing

INDUSTRY MEETING

A Special Coal Age Staff-Written Report



Handle your widely-separated pit maintenance and clean-up jobs swiftly and economically with one man and a LeTourneau-Westinghouse Tournatractor®. This rubber-tired tractor speeds to the job under its own power . . . over paved roads, down shot-banks, cross-country or over railroad tracks. There are no delays while tractor crawls to new locations.

LW tractor gives you better speed at the work area, too. Acceleration is fast, with 218-hp operating through sealed anti-friction drive. Maneuverability is quick and easy. Also, there's no loss of momentum to shift gears, because this tractor's gears are constantly in mesh. Even reverse action is *instant*.

Handles wide variety of jobs

You can use just one Tournatractor to clean-up around 2 or more shovels . . . and at the same time maintain stock-piles, level waste dumps, clean debris off RR tracks, clean benches, handle shallow stripping, tow air-compressors, or pull supply and service wagons. You can even use this speedy, mobile tractor for maintenance and clean-up in one or more adjoining pits.

Biggest tractor value today!

In addition to giving you these plus operating advantages, LeTourneau-Westinghouse Tournatractor *costs less* to own, and *much less* to maintain than a track-type tractor of comparable horsepower. Let us demonstrate this rubber-tired tractor at your pit. Watch Tournatractor perform under *your* working conditions. You'll find it can handle scattered tractor jobs faster, more efficiently, to help cut your tractor costs.

Powerful LW Tournatractor spreads and compacts conveyor-dumped mineral-bearing soil. At this plant, mobile rubber-tired tractor also pulls rail cars, handles dump maintenance, and operates a towed scraper.

CT-2101-MQI-1

LW

LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

Assistant Treasurer—C. P. O'Neill
Counsel—Frank G. Smith

In addition to the formal presentations the business session included committee reports, in the course of which Mr. Laing called attention to the dust-sampling and lung X-raying program of the Pennsylvania Dept. of Health, observing that it could lead to increased payments for treatment of occupational diseases by the coal industry. He also reported on the results of a survey to determine what effects, if any, the protective wage clause in the last contract had on the Central Pennsylvania situation. Basically, nonunion mines in the first part of the year had increased their tonnage 26%; union operations 5.9%. No union company reported gaining new business while several reported losses.

The Coal Outlook

Analyzing Dist. 1 prospects, market by market, Mr. Forsythe found potentials for increases in all with the exception of domestic. Electric utilities offer the best possibilities and the 25 in Dist. 1 marketing territory will increase coal burn 8% in 1960 and 40% in 1965. But the area can do much better, since 35 new generating units are planned in the territory to 1963 with a total coal rate in excess of 21 million tons a year, bringing the total sales potential up to 30 million tons annually.

The outlook in the general industrial market is not unfavorable, Mr. Forsythe noted, and prospects are good for metallurgical coal. In addition, an upsurge in business is inevitable and coal should show a gain of at least 10% in 1960 over 1958 and 1959, and has excellent prospects in the farther future. But the question is: "What can Dist. 1 do to take fullest advantage of these opportunities?" Among the answers suggested by Mr. Forsythe were:

A drive to get lowest possible production cost with maximum quality.

Examination of all possible opportunities for cutting cost of getting coal to the consumer.

Market studies to show sales opportunities.

The best in merchandising methods. Selling only against other coal should be terminated immediately in favor of selling against competition.

Research to uncover new uses for coal and expand existing markets.

The utmost in cooperation with other producers, the allied industries and the consumer.

Merchandising

Presenting the merchandising program of BCI, Mr. Hardy noted that a major need is a new and favorable public conception, or image, of coal as a modern fuel rather than the common one of an outmoded and fading source of heat and energy. BCI's job is to create that new image; its objectives are:

The new plant market—"Get 'em on coal!"

Prevention of conversion from coal—"Keep 'em on coal!"

Conversion back to coal—"Sell 'em on coal!"

The big need, Mr. Hardy observed, is more cooperation from top to bottom. Citing instances where such cooperative effort has paid off, and noting favorable equipment developments, such as, installation of the first high-pressure Coal-Pak and development of new low-cost vacuum ash removal by Allen-Sherman-Hoff, he further noted that coal sales in BCI's primary target area total 120 million tons, with oil the equivalent of another 120 million and gas 60 million.

Where BCI has had a chance to function the score has been 5 to 1 in its favor over competitive fuels, representing gains or retention of 18 million tons of business against losses of 4 million. Putting it another way, BCI's goal is to get the customer on coal and see that he stays on.

BELT FAILURES?
Switch to
NEW YORK RUBBER!

New York Rubber, famous since 1851, manufactures belt designed to meet trouble—and overcome it! Built for the most severe service demands, there's a New York Rubber belt designed to solve *your* problem. Mineral mining, quarrying, coal mining—these activities often require a belt that will show superior resistance to sharp and abrasive materials, frequently in the presence of oil and grease conditions. Fire, too, takes its toll of conventional belts.

That's why it will pay you to investigate New York Rubber. A brief description of four of our most popular belts follows. Write on your letterhead for more complete details on these and other superior New York Rubber Belts.

REDUCE FAILURES
with these New York Rubber belts:

STONORE—Highest quality, for most severe service. Handles heavy ores, trap rock, crushed stone, coarse broken glass, slag, cement clinkers, direct feed from digging and mining machinery. Mildew-proof.

DEPENDABLE—For handling coal both under and above ground, sand and gravel, trap rock, sulphur, lime and limestone. Ideal for sub-zero temperatures. Mildew-proof.

NEOPRENE—Resists oil and grease conditions adverse to natural rubber. Handles caustics and coal briquettes. Heat-resistant to 250°F. Mildew-proof.

TEMP-PRENE*—A neoprene compounded for fire resistance and severe, rough surfaces. Mildew-proof.

*Acceptance designation: "Fire Resistant, U.S.B.M. No. 28-14".

NY RUBBER
NEW YORK RUBBER
CORPORATION
Established 1851
100 PARK AVENUE • NEW YORK 17, NEW YORK

FRAMED FOR LONG LIFE

...to give you top performance on haul road maintenance

A strong, stable blade-foundation is essential if a grader is to give you high output. That's why LeTourneau-Westinghouse Adams* graders are given rugged, solid-strength, one-piece frames... that take all of the shocks, twists, and stresses of hardest day-to-day operating conditions.

Continuous-welded... front to rear

Front-to-rear members of the L-W main-frame are heavy steel U-channels. Up front, two full-length channels are welded together to form a box section. Channels separate at top of arch and become two boxes by addition of two heavy steel plates. Frame is continuous-welded from front bolster plate to boxed-in rear-end.

One major advantage of this boxed-channel framing is that it provides *maximum strength without excessive weight.* Result: with the L-W grader, more weight and strength can be built into important components, such as the big 63" L-W circle... none bigger in the industry... where size and strength mean better performance.

Steady blade-mount

This unique L-W main-frame also provides a stable mount for the blade. No matter how tough the going, its solid strength assures a big bite... a smooth, precise finish-surface. No faltering when the blade hits heavy loads or hard-pan... no "riding-up", or deflection.

Operator has clear view of blade

With circle-lift controls mounted forward on frame, both ends of blade are clearly visible to operator, *whether he's sitting or standing.* Clear view of blade assures more accurate grading... and more work done each day.

7 models... 67 to 190 hp

Let us show you any of the 7 high-speed LeTourneau-Westinghouse graders in action. We'll prove to you how these machines can grade faster... more accurately... at less cost. Ask for details and demonstration.

Unique, box-type, L-W Adams one-piece frame runs from front to rear without sharp bends... without joints... without breaking points. Seventy-three years of grader experience have gone into the development of this frame. It's the foundation for L-W grader's rigid, smooth-cutting qualities that get more work done fast... at lowest cost.

*Trademark G-1955-MQ-1

LW

LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

Fuels Conference Report

Modern mining . . . The values of modern preparation . . . Transportation costs and prospects . . . Evaluating coals for various applications . . . Coal characteristics and application in combustion and carbonization.

THE MINING AND PREPARATION of coal, factors involved in moving it to market and its use for various purposes were the major themes of the 22d annual Joint Solid Fuels Conference, Cincinnati, Oct. 27-29. Four technical sessions were supplemented by two luncheons and the annual banquet, with speakers and topics as follows:

Dr. A. A. Potter, president, Bituminous Coal Research, "Inventiveness and Human Betterment." Stressing the need for accelerated technical progress, Dr. Potter suggested a number of ways to encourage the necessary inventiveness.

Ernest S. Fields, president, Cincinnati Gas & Electric Co., "The Ohio River and Power Development." Presiding was Julian E. Tobey, president, Appalachian Coals Inc., and general conference chairman. By 1970, Mr. Fields noted, the electric utilities on the main stem of the Ohio probably will be consuming 50 million tons of coal a year, with the total rising to 100 million by 1980. Consumption in 1958 was 29 million.

Frederick W. Geisel, Cincinnati Post and Times-Star, "Black Africa," with Raymond E. Salvati, president, Island Creek Coal Co., and chairman of the Coal Div., AIME, presiding.

A feature of the banquet was the presentation, by David R. Mitchell, of the Percy Nicholls Award for 1959 to Dr. Hiram Homer Lowry, Wilmerding, Pa., consultant, director of the coal research laboratory of Carnegie Institute of Technology from 1930 to 1953, and distinguished in the field of the chemistry of coal utilization. The award was established in 1942 "for notable scientific or industrial achievement in the field of solid fuels," and went to Dr. Lowry for work "in the fields of coal chemistry, coal utilization, gas absorption and carbon" contributing materially "to improved industrial processing throughout the world."

AIME co-chairman for the four technical sessions were:

H. E. Mauck, vice president, Freeman Coal Mining Corp.

George E. Ritchie, coal traffic manager, engineering, Chesapeake & Ohio Ry.

Carroll F. Hardy, managing director, Bituminous Coal Institute.

James R. Garvey, director of research, Bituminous Coal Research.

Topics and speakers were:

"Special Railroad Rates for the Movement of Coal in Volume Quantities," C. P. Blair, assistant vice president, Norfolk & Western Ry.

"Volume rates" include trainload rates, multiple-car rates and conditional or incremental rates. Trainload rates are little used and are not likely to be, while multiple-car rates are widely employed. Conditional rates are now coming into use in increasing volume as a result of recent rate decisions including *Eastern Coal to Chicago,* or the "29-c" case, involving bulk movement of steam coal in addition to metallurgical; *Kentucky, Virginia and West Virginia to Virginia,* the first of the "incremental-increase" rate requests based on a reduction for 1¾ million tons a year minimum, and *Coal to N. Y. Harbor,* providing for a reduction of 50c to meet oil competition for 2½ million tons in excess of the initial 3 million tons.

"We on the Norfolk & Western believe that there is a definite place in the rate structure for volume rates, and we intend to make use of them whenever the situation requires." This conclusion was echoed by representatives of other coal originating roads present at the meeting.

Design of a Modern Coal Mine, G. W. McCaa, general manager, Hanna Coal Co., Div. Consolidation Coal Co.

Reviewing the major factors involved in the design and operation of the Ireland mine, Mr. McCaa noted that it was opened to supply fuel for the Kammer power station. Capacity of the two-circuit preparation plant is 1,350 tph, and it uses Chance cones for cleaning all coal over ⅜ in after reduction of the raw feed to a top size of 6 in. Coal comes from the Pittsburgh seam, via a 60-in slope belt and is produced by continuous miners with integral roof bolters, pickup loaders, shuttle cars, ropeframe conveyors, 17-ton cars, 27- and 50-ton locomotives. Planks and bolts are used for roof support.

Heavy cover and poor top conditions resulted in a decision when the mine was opened to split pillars one or two ways, said pillars to be formed by panels 2,000 ft long with 6 or 7 working places on 80-ft centers, rooms and crosscuts. Number of places has been reduced to five to reduce width of working panels, and crosscuts are turned 60 deg and staggered. The aim was to reduce falls behind the working faces as a result of roof conditions. "We are also developing a panel to experimentally mine rooms on the retreat."

Features of mining and preparation listed by Mr. McCaa include roof-bolting and guniting of the main haulage opening, gravity flow of coal through preparation plant, Hyslop shaking distributor and screen drives, closed-circuit water system also recovering sand very efficiently (16 tons of sand consumed for 1 million tons of output), use of a double screen (Hyslop) drive with 2-in round-hole plate following the washed coal crushers to remove pieces of conveyor belt and hydraulic and water hose, use of 5/16-in hex screen instead of ⅜-in woven wire screen for better results in scalping ⅜x0 out of the raw feed, and three-man plant operation.

Opening new provided an opportunity to install AC for face equipment and thus obtain its safety, cost and other advantages. Among other things, the increased electrical efficiency is saving $7,000 a year in expenditures for power.

Control—The Key to Preparation for the Export Market, Martial P. Corriveau, preparation engineer, Clinchfield Coal Corp. Div., The Pittston Co., Dante, Va.

The preparation of coal for export is little different than for domestic markets, except the foreign buyer always demands a well-prepared top-quality product, and is willing to pay for it.

"Today the export buyer wants American coals not so much for a price but for the necessity of blending with for-

INDUSTRY MEETING

A Special COAL AGE Staff-Written Report

eign coals to achieve the desired chemical and/or physical characteristics. To blend intelligently he must know in detail the qualities of the coals to be blended."

With Clinchfield the quality control necessary for accurate blending starts in the plant. Every car loaded is sampled by hand or automatically and large samples are taken regularly to check coking qualities. The Clinchfield central laboratory is set up for both analytical and carbonizing sections. At the present time also, Clinchfield is using its personnel and laboratory results to, among other things, develop correlations, if any, between the data from various coking tests and/or that from proximate analyses. A unique two-compartment drum made especially for Clinchfield has permitted correlation between the Micum Number and the Stability Factor provided by European and American tumbler tests.

Relationship of Coal-Ash Viscosity to Chemical Composition, W. L. Safe, research engineer, and J. B. McIlroy, group leader, fuels section, chemical laboratory, Babcock & Wilcox Co.

"Laboratory analysis of a coal and its ash can be practically and reliably used to predict slag behavior in the furnace of a power boiler." This, among other things, helps the coal producer determine the suitability of his product for use in the specified equipment.

Fireside Corrosion of Superheater and Reheater Tubing, James Jonakin, section leader, fuels research; R. T. Reese, research engineer, Combustion Engineering, Inc., and G. A. Rice, mechanical engineer, Electric Energy, Inc.

Coal Evaluation for the Beckjord Station, Cincinnati Gas & Electric Co., J. F. Cotter, manager of performance, Combustion Engineering Inc.

Ultimate cost of coal for power plants represents not only procurement but also utilization costs. Determination of this ultimate cost can be achieved in most central stations with station manpower and instrumentation, though the basic method must be adjusted somewhat to meet the peculiar conditions at each plant.

Preparation of Coal for Utility Use, Arthur S. Maynard, plant superintendent, Truax-Traer Coal Co., Ceredo, W. Va.

Changing equipment and changing emphasis have affected the preparation of coal for industrial use. The size consist of industrial coal is important—in some instances more than ash. There has been a trend to standardization of sizes, in turn making possible simpler and more efficient preparation plants. In addition to ash, reduction of surface moisture is important in the production of industrial coal. Methods include adding oil, becoming more common in recent years, and mechanical and heat drying.

Though raw coal may be used in certain plants, the owners should consider the uniformity advantages of the cleaned product. Also, as the distance from mine to plant increases, a low impurity content becomes more important.

"Preparation plants that process industrial coals utilize the same equipment or combinations of equipment as other plants producing a quality fuel. Assuming a certain preparation plant was producing only industrial coal there would be more flexibility of screening, sizing and blending facilities."

Preparation of Coal for Utility Use, Myron W. Mellor, McNally Pittsburg Mfg. Corp.

The big question in any study of preparation of coal for electric generation is final cost of the energy delivered to the transmission lines. No one power plant or preparation method is the best, and each must be tailored to the job. But regardless of type, preparation pays. Controlled blending for uniformity of feed is one benefit, along with continuous sampling for quality control.

Increased attention to fine-coal preparation reflected growing utility demand. At the same time coarse-coal cleaning has improved, and heavy medium has come into the picture to help meet competition and also demands for ash reductions that necessitate new lows in separating gravity. Less inerts helps cut expenditures for transportation—and in the area of transportation new facilities for loading and handling into and out of railroad cars, trucks and barges include completely automatic car-loading units.

A Long-Range Appraisal of Mechanical Mining, A. Lee Barrett, research director, Joy Mfg. Co.

The transition from hand loading to continuous mining has been marked, among other things, by a considerable shrinkage in the production area—from 1,000 to 10 in number of places for 5,000 tons per day, for example, with the continuous unit providing, say, 50 tons per faceman per shift, compared to 5 for hand loading. If the $25 wage scale had prevailed throughout, present face labor cost of 50c per ton would compare with $5 with hand loading.

The present face labor cost can be further cut but the possibilities are not as great as in the past. Therefore, other avenues to reduction must be considered. One is further shrinkage in the producing area. Weighing the savings in haulage, ventilation and other operations as a result of achieving the maximum in shrinkage, it could reach 29%. With an average of $1.40 susceptible to such reduction, the saving on this basis amounts to 40c. There is no other place at present where a similar saving could be made. Achieving will not necessarily be easy and the main consideration will be fitting the mining plan to the machine available. New machines cannot be used with old methods if maximum results are to be achieved.

As for the machines themselves, they cannot be produced in a vacuum. Operators and manufacturers must get together to achieve an integrated system with methods and machines coordinated to get the results desired. The Carbide miner provides one opportunity to achieve such a system, which could provide a face-labor cost of 5 to 30c per ton and a total cost, including overhead, of $2 to $3 per ton, including 35 to 40c per ton for amortization of equipment cost.

Use of Bench-Scale Tests to Predict Combustion Performance of Coals, E. W. Zawadski, chemist, and Felix du Breuil, project engineer, Bituminous Coal Research.

Investigation of the plastic and smelting properties of a series of bituminous coals, varying in rank and combustion properties, indicates that a reliable bench-scale test procedure can be developed to predict performance in full-scale combustion equipment.

Survey of the Carbonizing Properties of American Coals, D. E. Wolfson, chief, Coal-Carbonizing Sec., USBM.

Investigation of carbonizing properties begun many years ago is being continued. All data to date will be summarized in a series of reports which will be, in effect, a "Handbook of Carbonization Data."

Factors to consider in the Use and Application of Industrial Coals, U. B. Yeager, fuel engineer, Island Creek Coal Sales Co.

Basic considerations are the coal itself, equipment and objective in burning the coal, and the skill and qualifications of the personnel for the burning installation. For the coal itself the four items of main concern are: comparative heat values; the effect of coal characteristics on the realization of the heat values; the effect of handling and burning equipment and methods on heat yield; and certain hidden factors, as, convenience, cleanliness, etc., plus cost of plant, operating labor, maintenance and so on.

Evaluation of a coal at destination takes in cost per million Btu at the mine, freight charges, handling at the receiving end, firing or using labor, losses in firing or using, plant maintenance, ash-handling cost, and costs of ordering and assuring delivery. Neither the price per ton at the mine nor cost per million Btu is sufficient for proper evaluation. All other things given due weight, the better coal normally is more valuable than the poorer or poorer-prepared.

The White Sulphur Meeting

S. DUNLAP BRADY JR., president, West Virginia Coal Mining Institute

W. J. SKEWES, chairman, Central Appalachian Sec., AIME

Central Appalachian Sec., AIME, and West Virginia Coal Mining Institute cover mining, preparation and power, plus forestry and manpower.

MODERN METHODS and equipment for coal mining and preparation were the major topics at the 1959 annual meeting of the Central Appalachian Sec., AIME, and the West Virginia Coal Mining Institute, White Sulphur Springs, W. Va., with the National Coal Association reorganization, coal's need for engineering and technical manpower, and forest management as added starters.

Chairman of the program committee was Fred R. Toothman, engineer, coal properties, Chesapeake & Ohio Ry., Huntington, W. Va. Chairmen and co-chairmen of the various sessions were:

E. M. Spokes, University of Kentucky, Lexington.

J. B. Herring, Chesapeake & Ohio Ry., Huntington, W. Va.

S. Dunlap Brady Jr., Baltimore & Ohio and Pittsburgh & Lake Erie railroads, Summersville, W. Va. (luncheon).

D. A. Zegeer, Bethlehem Mines Corp., Jenkins, Ky.

R. C. Luther, Pocahontas Fuel Corp., Pocahontas, Va.

Carel Robinson, consulting engineer, Charleston, W. Va. (presiding at the annual dinner).

Dr. Charles E. Lawall, coal consultant and vice president, Society of Mining Engineers, Huntington (toastmaster).

Richard F. Wesner, Boone County Coal Corp., Sharples, W. Va.

E. M. Pace, Inland Steel Co., Wheelwright, Ky.

In business sessions, officers were elected or confirmed as shown in accompanying panels, and it was announced that Central Appalachian scholarships were being held by the following:

Michael J. Hudak Jr., West Virginia University.

Frank L. Marsili, University of Kentucky.

Marvin H. Bishop, Virginia Polytechnic Institute.

Technical sessions included papers as follows:

Comparison of Continuous Mining and Mobile Loading in the Same Mine Under Similar Conditions, U. A. Cobb, superintendent of mines, Kopperston (W. Va.) operations, Eastern Gas & Fuel Associates.

A 6-mo study of conventional v. continuous mining under identical conditions resulted in the following comparison of nonproductive time under the conditions in the specific area:

Officer Rosters

West Virginia Coal Mining Institute

President—S. Dunlap Brady Jr., consulting mining engineer, Baltimore & Ohio and Pittsburgh & Lake Erie railroads, succeeding R. G. Lazzell, development and research engineer, Island Creek Coal Co.

Vice Presidents—Stephen Canonico, Compass Coal Div., Clinchfield Coal Co.; Joseph L. McQuade, Maust Coal & Coke Co.; N. T. Camicia, Island Creek Coal Co.; Harold Suter, Christopher Coal Co.; David Ridenour, Olga Coal Co.

Executive Board—Harry Quenon, Eastern Gas & Fuel Associates; Roland C. Luther, Pocahontas Fuel Co., Div. Consolidation Coal Co.; C. R. Nailler, Christopher Coal Co., Div. Consolidation Coal Co.; George C. McCaa, general manager, W. Va. Div., Hanna Coal Co., Div. Consolidation Coal Co.; and Mr. Lazzell.

Secretary-Treasurer—G. R. Spindler, head, School of Mines, West Virginia University, Morgantown, W. Va.

Central Appalachian Sec., AIME

Chairman—W. J. Skewes, chief engineer, Pocahontas Fuel Co., Div. Consolidation Coal Co., succeeding Carel Robinson, of Robinson & Robinson, consulting engineers, Charleston, W. Va.

Vice Chairmen—D. A. Zegeer, Bethlehem Mines Corp.; F. R. Toothman, Chesapeake & Ohio Ry.; and R. C. Luther, Pocahontas Fuel Co., Div. Consolidation Coal Co.

Executive Committeemen—John L. Schroder Jr., Coal Div., U. S. Steel Corp.; G. R. Spindler, School of Mines, West Virginia University.

Secretary-Treasurer—Charles T. Holland, head, Dept. of Mining Engineering, Virginia Polytechnic Institute, Blacksburg, Va.

	Mobile Loading, 11BU	Continuous Mining 1-JCM
Moves to new face area	149	5
Total advance, ft	1,269	1,269
Cu ft material removed	203,000	203,000
Total tram distance, ft	31,500	550
Total tram time, min	306	25
Total loading time, min*	2,368	1,825
Total repositioning time, min	960	84
Ft advanced per move	8.5	254
Ft trammed per move, prorated	211	110
Tram, load, reposition per move, min	24.39	386.70
No. shuttle cars per move	15	445
Recovery without roof-bolting	16%	44%

*11BU pickup loader behind miner.

Though the minimum places for maximum production from conventional equipment should be five, roof conditions prevent operating with more than three. Under these conditions, average output was 380 tons per shift with 11 men, including the foreman. In contrast, miner performance in the same 6-mo period was 500 tons of clean coal with an 11-man crew.

The extra production is in part a result of a major reduction in nonproductive time, as well as the limited opportunity to depart from the standard operating plan plus greater concentration. These benefits more than offset the advantages of conventional mining, including reduced susceptibility to adverse changes in mining conditions, less difficulty in maintenance, less need for spare equipment, and less difficulty in controlling impurities in coal delivered to the preparation plant.

Pillar Extraction With Continuous Mining Machines, J. S. Whittaker, vice president, operations, Pittsburgh Coal Co., Library, Pa.

Overlying drawslate has so far made entry development with continuous equipment difficult. Consequently, the machines, of the ripper type, are used only in pillar extraction. The miners are equipped with roof-bolters and are operated by 6-man crews, with shuttle-car and pickup-loader service to track or belt. In final stump extraction the miners load directly to the shuttle cars for safety reasons.

Square and rectangular pillars are employed, and are mined by pocketing across 16 ft wide leaving a 12-ft fender, which in turn is extracted by smaller pockets. Then the operation is repeated on the second gob side, alternating until

INDUSTRY MEETING— A Special COAL AGE Staff-Written Report

a final stump, which is pushed out head-on. Posts are used in fender extraction and are set by the roof-bolters. In three mines cribs are set at each pocket entrance and on both sides of the miner track in final stump pushout. Recovery in individual pillars is approximately 85%.

Voltage is 250 and 550 DC. In maintenance, double-shift operation has been found to permit the use of stagger units to provide an idle unit each shift for necessary attention. Results are more tons per machine-shift with reduced maintenance cost in spite of the extra capital expenditures. In triple-shifting, a spare section is desirable. Bit cost—machine-ground carbide—is 8 to 10c per ton. All miners are rebuilt after they have mined 100,000 to 125,000 cleaned tons.

Panels are projected to provide bleeders where possible. Water sprays plus "through-the-steel" collection suppress roof-drilling dust, with multiple water sprays to control coal dust.

Miner productivity, full-seam operation, is 300 to 325 clean tons and 425 to 500 tons of raw material per shift, making face performance 45 to 50 cleaned tons per man per shift.

Improved Techniques in Mining From the Outcrop with Continuous Mining Machines, J. W. Heimaster, Bore-Mining Dept., Union Carbide Olefins Co., S. Charleston, W. Va.

Union Carbide became interested in a remotely controlled mining machine in 1946, and put its first full-scale unit into operation in 1949. "This experimental machine, while not a commercial success, pointed the way to the development of a practical system for mining by remote control."

A new, heavier and more powerful machine was put into operation in 1953. A major improvement was the replacement of the original belt conveyors, which had to be installed and removed one at a time, with a continuous train of chain units operating as a unit in advancing into the mine and retreating back out around a short-radius curve on a plank roadway. Time lost in adding and removing conveyors was reduced, as was time lost in retracting to change bits.

The new conveyors were widened to 60 in from a 24-in width. "'Minor' roof falls up to 6 ft wide, 8 to 10 in thick and up to 100 ft long are caught by these wide conveyors and carried out without incident." Consequently it is unnecessary for men to go underground to clean up, unless the falls exceed 12 in, which is rare. Breaking strength of the conveyor structures and hitches is 50 tons, so that if necessary conveyors and miners can be winched out.

Two operators are required—one to guide the machine and the other to observe and control the operation of the conveyor train. Except for time required for changing bits, the unit is available 85% of the time. Production records are 10,375 tons for a 7-day 3-shift-per-day week and 41,000 tons for a 31-day month. Size of hole bored is 116 in wide and 38 in high.

A commercial unit is now being built by Joy. "Serious consideration also is being given to adapting this system for use underground. One scheme suggested involves making a well-ventilated well-protected gallery of sufficient width to serve as the operating area and mining by remote control from both sides . . . Joy appreciates the advantages of an underground version of this system and hopes to have such a system commercially available in about 5 yr."

Discussion following presentation of the three papers brought out, among other points, that continuous mining usually cuts section costs 25 to 30% compared to conventional mining.

NCA Reorganization and the Washington Picture, Robert E. Lee Hall, general counsel, National Coal Association.

Formation of the National Coal Policy Conference and reorganization of the National Coal Association reflect the need for better instruments to accomplish coal's objectives, the major one being to assist coal to preserve and expand markets. Unfair competition is the crux of the problem, calling for a new national fuels policy superseding the old informal one that tends to discriminate against coal.

Some Aspects of Forest Management for Land's Sake, D. B. Bonebrake, forester, Pocahontas Land Corp., Bluefield, W. Va.

Proper regard for forest-management principles can materially increase the yield of timber. A 10-in tree, for example, requires 30 yr and if cut at that time yields 60 bd ft. If left to grow to 16 in (60 yr), the yield is 240 bd ft. How soon cutting is done is a management decision. Fire control is a major problem, especially in coal areas, and not too much progress has been made in this direction even yet.

Fine-Coal Cleaning in the Pocahontas Field, Charles W. Porterfield, director of research, and Guy N. Haynes, superintendent of preparation plants, Pocahontas Fuel Co., Div. Consolidation Coal Co.

Full-seam mechanical mining has in most instances resulted in making the ash content of ¾x0 coal too high, es-

pecially for the metallurgical market, spurring the growth of fine-coal cleaning. The increase in ash was accompanied by a major increase in the percentage of ⅜x0—from 40 to 65% in a typical raw-coal sample.

Inherent washability and recovery are good. Ash is highest and recovery is lowest in the coarsest fraction, with the minus 100M constituting about 7% of the raw ⅜x0 and running 10% ash.

Varying circuits include the following:

1. Deister single- and double-deck tables cleaning efficiently down to 50M, and decreasing down to 200M, at 1.60 and possibly as low as 1.55 if near-gravity material is removed. In this circuit a centrifuge is used for dewatering, followed by a filter for the centrifuge fines.

2. Deister tables handling air-cleaner middlings and rejects. Sometimes air tables are used to dedust the coal to keep fines out of the water and improve wettable performance.

3. Heavy medium, cleaning efficiently down to 1:30 at sizes down to ⅛ in or smaller, for ⅜x$^{3}/_{16}$, with minus $^{3}/_{16}$ to the wet tables. The additional ash reduction in the ⅜x$^{3}/_{16}$ cuts the ash of the entire ⅜x0 fraction.

4. Froth flotation ahead of the filter for additional ash reduction. Flotation units can clean efficiently up to 50 to 30M.

5. Untried in the field yet but looked upon as a good future possibility is the heavy-medium cyclone. Possible applications include recleaning near-gravity material from wet tables, or as a primary cleaner along with froth flotation in a new plant.

Formal discussion by Henry F. Hebley, Pittsburgh, industry representative in water-pollution matters, stressed the present critical situation facing producers in territory covered by the Ohio River Valley Sanitary Water Commission. Noting that the commission now proposes to control all possible pollutants, Mr. Hebley noted that the list includes not only suspended solids but also acid and dissolved solids, or, in the words of Orsanco, "anything that degrades the water of the stream systems."

The coal industry, Mr. Hebley emphasized, is not yet fully aware of what is likely to happen. The big need is to become informed and take positive steps to prevent being caught flatfooted by possibly extremely severe regulations.

The Present Status of Hydraulics for Mining Machinery, Joseph J. Slomer, chief hydraulic engineer, Goodman Mfg. Co., Chicago.

Hydraulics is growing, with applications expanding faster than people can be trained to service the systems and equipment. "Our circuits are constantly being revised to add improvements to make the units more accessible and provide means for checking, keeping the fluid clean, and visual means for observing the leakage of the circuits."

The most important trouble-maker is dirt and means to combat it include a filler pump for transferring fluid, a strainer on the filler-pump line, 30M intake strainers, micronic filters to take out the very-fine contaminants, and baffles in tanks to collect materials that settle out. Automatic bleed valves now release air pockets, and outlets are provided for vacuum gages on the intake sides of pumps. Pressure-gage outlets are provided on all pumps. "We prefer" not to use pressure hose on the pump intake, and also prefer pressed-on hose fittings with male threads on both ends.

Micronic filtering is a must at higher pressures. The higher the pressures the shorter the life of pumps, etc. Manufacturers now rate these units at 1,000 psi without and 1,500 psi with micronic filtering. Vacuum and pressure gages and a means of checking volume should be available to all electricians or mechanics. "To get maximum life from the units, or maximum coal output, you should insist on clean oil, clean filters and the lowest pressure the machine will operate on."

Technical Manpower for Coal, Joseph E. Moody, president, Southern Coal Producers Association and National Coal Policy Conference, Inc., Washington, D. C.

"It is obvious that we cannot erect a super technology upon a flimsy, undermanned industrial foundation. Nor can we have the balanced and dynamic economy which we require unless we have a balanced and dynamic technology . . . The NCPC, since its formation early this year, has found increasing reason for concern over this problem of obtaining technicians, including mining engineers for the coal industry."

Investigation reveals an alarming downward trend in mining-engineering enrollment, in part as a result of the attitude of the mineral industries themselves. Coal, for example, has been and still is widely portrayed as an industry without a future with all too little rebuttal. Instead, the industry offers young people a challenge without parallel and "should undertake, without delay, an aggressive, adequate and thorough campaign to recruit mining engineers and other technicians. The campaign should begin with the high schools—perhaps before—and should be joined in by all elements in coal and allied industries. "The NCPC pledges its help in every way possible."

Highlights of the Moss No. 3 Preparation Plant (motion picture and commentary), R. E. Joslin, preparation manager, Clinchfield Coal Co., Dante, Va.

Four portals and two loading points 8 mi away provide coal for the plant via railroad cars. The plant went into operation a year ago and since has produced 3 million tons. Output has run 35% steam and 65% metallurgical. Present production is 17,000 tons in two shifts; in 1960 it will reach 24,000 to 25,000 tons.

DC Voltage and Productivity in Operation Sections, Guy Baker, assistant superintendent, power and mechanical department, and E. H. Roberts, chief mining engineer, Inland Steel Co., Wheelwright, Ky.

"One of the important cost areas frequently neglected in the mining industry is that of providing adequate voltage for the machinery at the working face." Good voltage normally is considered voltage not more than 10% above or below nameplate rating. Low voltage cuts motor speed almost in direct proportion and in turn decreases production. It increases heating and in turn maintenance. Sluggish machine reaction cuts employee morale.

In a program to improve the face situation at Wheelwright it was accepted that the dollar cost of improving voltage could be determined without undue difficulty, and in turn would permit determination of how much would be justified.

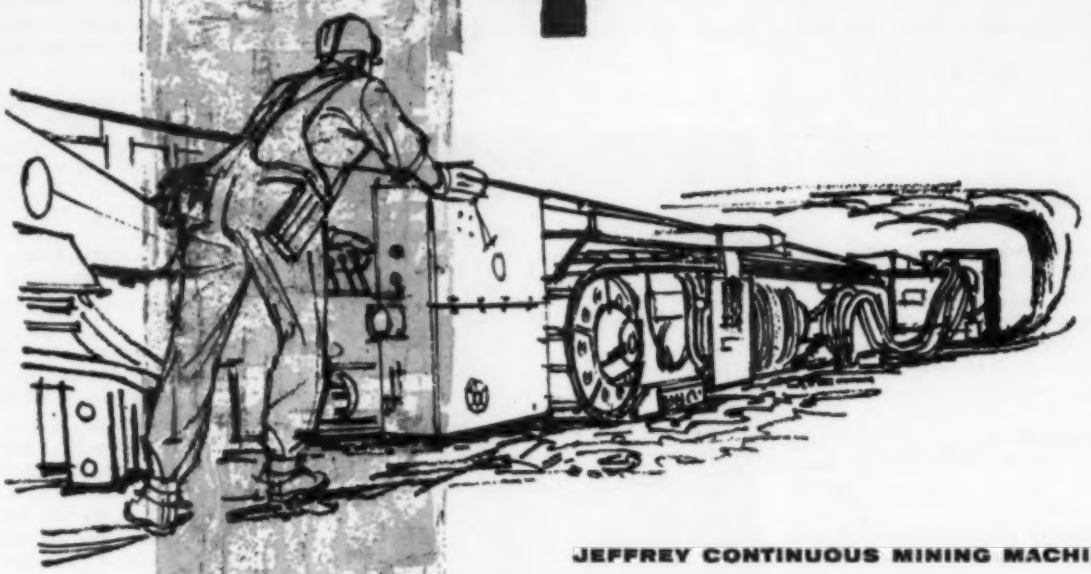
In one instance, as an example, improvement was calculated to result in 10.0 more tons of clean coal per machine shift. Taking only half to be conservative, and using a value of $4 per ton, the cost of installing 2,000 ft of copper ($3,000) was returned in 150 operating shifts.

"Other direct and indirect benefits have resulted from concentrating on electrical improvements. Some of these are: better bonding practices, more effective use of substations, larger trailing cables, improved trailing-cable-splice care, more attention to feeder connection joints, including more widespread use of Cadweld splice connections, relocation of one mining section, and now advancement of feeder cable with each track-loop setup in all cases. We also feel that the morale of the foreman and his men has improved noticeably."

In formal discussion R. D. Greer, Joy Mfg. Co., Franklin, Pa., noted that his company was the first among manufacturers to raise the standard for DC motors from 230 to 250 V. In addition to its effect on production, undervoltage jacks up maintenance cost. Heat developed by the motor while doing work is of prime importance. Heating also can accompany overvoltage, and those correcting undervoltage should not go too far the other way.

(Continued on p 151)

choose from 4 types of Jeffrey Colmols®



JEFFREY CONTINUOUS MINING MACHINES

GENERAL SPECIFICATIONS

	86-A	76-AM	76-BM	76-CM
Maximum mining height	44"	60"	77"	96"
Minimum mining height	28"	38"	50½"	67"
Width of cut	14'-7"	9'-8"	10'-9¾"	10'-9¾"
Minimum tramming height	25¼"	34½"	48¾"	63¾"
Width over crawlers	10'-0½"	72"	77"	77"
Length	34'-3"	29'-5½"	33'-10"	33'-10"
Tramming speed (feet per min.)	22'	20'	20'	20'
Feed speed (inches per min.)	0" to 51"	0" to 36"	0" to 36"	0" to 36"
Electric motors (total HP)	190	150	190	250
Weight—approx. (lbs.)	92,000	56,000	73,000	75,000

Voltage: Colmols can be built for operation on any of the following voltages: 250 V or 500 V, DC; 440 V, 3-ph, 60-cy., or 415 V, 3-ph, 50-cy., AC.

1 RANGE — Choose from four basic types. Variations within each type give the range that's ideally suited for your operation. You pay for what you need—and that's all.

2 CONTROL — Colmol mining is controlled mining. The operator is in full command, gets smooth, immediate, positive response from electric-hydraulic controls . . . centralized for convenience, safety, easy access . . . located so that the operator has an unobstructed view of cutting and discharge operations . . . minimum operator fatigue.

3 CAPACITY — Loading rates vary with hardness of coal, impurities in the seam, condition of roof and floor, as well as other factors. Colmol's boring principle of cutting and breaking while advancing in the coal with a minimum of waste motion, assures highest loading rates with maximum face time. Want highest possible tonnage? Then you want Colmols!

COAL PRODUCTION RECORDS SHOW LOWEST COST PER TON WITH JEFFREY COLMOLS

Get facts now...

Call or write your nearest Jeffrey office

THE JEFFREY MANUFACTURING COMPANY
912 North Fourth Street • Columbus 16, Ohio

JEFFREY

MINING • CONVEYING • PROCESSING EQUIPMENT...TRANSMISSION MACHINERY...CONTRACT MANUFACTURING

SCPA Looks at the Coal Picture

The market opportunities of today and tomorrow keynote SCPA sessions, with contract, operating methods and other matters as added starters.

MARKETS for the immediate and more-distant future dominated proceedings at the 18th annual meeting of the Southern Coal Producers' Association, at the Hotel Roanoke, Roanoke, Va., Nov. 9. Second in the list of major topics was labor and contractual relations, plus fuels policies, coal profits and related subjects.

Markets, realization and labor relations discussions appeared early in the program in the reports of officers and committees, including the following.

Joseph E. Moody, president—Covering a number of points, Mr. Moody noted that SCPA had cooperated fully in the reorganization and merger of NCA and other industry associations and agencies and was looking forward to the ensuing benefits. Turning to the Labor-Management Reporting and Disclosure Act, he pointed out that it means a new approach by the union in certain areas. Careful study of the act and particularly of its limitations is a necessity, and district associations should take the opportunity to review their positions and act to increase strength and efficiency—for one reason because of a worsening situation as to contract interpretation, including unauthorized strikes. To solve these problems relief must be had from a change in the contract or in some other form.

Adoption of the protective wage clause was a major step and showed more cooperative desire than might have been expected. The important fact is that the effort was made and the clause and the joint committee set up under it should help both union and operators in solving industry problems.

The National Coal Policy Conference, Mr. Moody observed, represents a new benchmark in cooperative effort and reflects the "unique leadership available in the coal industry." It has already shown its effectiveness in the fields of a national fuels policy, control of residual imports, and improved public relations, despite the so-far short period of its existence. NCPC has a strong and positive program not in conflict with any other group, and will help coal materially in seeking its proper place in the economy, and in eliminating a number of industry problems.

Turning to markets in a subsequent presentation, Mr. Moody gave the highlights of a survey of the "other" or general-industry market. Some 320 economists throughout industry were asked how much coal these industries had used and their plans for 1960. The findings show that 1960 will be the biggest since World War II. Excluding pulp and paper (15,000,000 tons) general industry expects to use 98,464,000 tons of coal in 1960—a big gain over 1959. Reasons include an optimistic view of business next year and a spreading realization that coal stands out as an industrial fuel. The study also shows good prospects for expansion in the future.

Continued in Office

JOSEPH E. MOODY was again elected president of the Southern Coal Producers' Association at the 18th Annual Meeting Nov. 9. John F. Lane, of Washington, D. C., was again chosen secretary, and L. E. Tierney Jr., Eastern Coal Corp., Bluefield, W. Va., was re-elected treasurer.

J. B. Benson, safety director—Pointing out that the last campaign had shown real results in cutting roof-fall accidents, Mr. Benson urged the enrolment of all companies in the new 1960 campaign.

Fred Welker, statistician—Reports on cost and realization in Dists. 7 and 8, covering 45 companies with 124 mines producing 25,300,000 tons, or 80% of the membership total showed, for the first 6 mo of 1959, the following realizations per ton before federal taxes:

Companies	Output	Profit	Loss
20	19,200,000	29.5c	....
25	6,100,000	....	51.8c
Total	25,300,000	9.8c	....
1958	....	4.2c	....
1957	....	36.3c	....

For the first 9 mo of 1959, Dist. 7 showed an overall profit of 18.4c; Dist. 8, a loss of 9.0c per ton.

John F. Lane, secretary and general counsel—Noting that SCPA had been named a defendant in Kelly v. UMWA and others, charging conspiracy resulting in the protective wage clause, Mr. Lane then disclosed that the association had been dismissed as a defendant on technical grounds. He noted further that the new Griffin-Landrum Act removed the threat of suit and financial liability growing out of charges that the union-shop provision was legally invalid because of failure of union officials to file non-Communist affidavits, thus rendering all welfare-fund and similar payments invalid.

One of the problems arising out of the provisions of the act involves industry activities under the protective wage clause. As a result, the Joint Industry Contract Committee, on Nov. 4, adopted a resolution which suspends the activities of the committee, thus advising all the industry that enforcement of the clause is suspended and legally "insulating" the operators against possible action when that part of the act is effective.

Formal presentations by various authorities were the highlights of technical, luncheon and dinner sessions presided over by:

L. Newton Thomas, president, Carbon Fuel Co.

Roland C. Luther, vice president, Pocahontas Fuel Co.

Warren F. Leatherman, president, Crozer Coal & Land Co.

John J. Foster, chairman, executive committee, Southern Coal Producers' Association, and vice president, Island Creek Coal Co.

The Labor-Management Reporting and Disclosure Act, John S. Forsythe, general counsel, Senate Committee on Labor and Public Welfare, Washington, D. C.

Reviewing the history of federal labor legislation, Mr. Forsythe noted that recent laws have been aimed at curbing the powers previously granted to unions.

INDUSTRY MEETING—
A Special COAL AGE Staff-Written Report

The new Griffith-Landrum Act drastically cuts certain of these powers and for the first time puts government squarely into the regulation of union affairs. Employers also are subject to certain new regulations, including the "hot-cargo" clause with a direct bearing on the protective wage clause.

Speculating on what may happen in the next session of Congress, Mr. Forsythe noted that many people are convinced that the national-emergency provisions of Taft-Hartley are not sufficient to protect the public. The present remedy is too inflexible. Many alternatives have been proposed, including compulsory arbitration and labor courts. For the best in results, the final machinery "must be flexible enough so that the government will have different procedures" and the parties to the dispute will be unable to take certain positions on the basis of past actions, thus hampering or ruling out real negotiation.

The Reopened Door, Thomas R. Jordan, assistant managing news editor, *Electrical World*, a McGraw-Hill publication.

"Electric home heating and the heat pump, which are rightly regarded as the keystones to the all-electric home, are providing the U. S. coal industry with a splendid opportunity to get back into the home-heating business—a business you dominated not too long ago . . . For just as surely as oil took most of the home-heating market from coal, and gas in turn is taking some of it from oil, electricity is going to take it from both . . . which is another way of saying that coal will get a big share of it back."

Electrical World's 1959 survey of comfort-heating and heat-pump use showed that as of June 30, 1959, some 548,000 homes and 33,000 commercial and industrial buildings were completely heated electrically. The total in the 1957 survey was 290,000. Additions to the end of 1960 are estimated at 32,250 in the last half of 1959 and 78,900 in 1960. In terms of coal, this means, with 621,000 buildings at the end of 1959, a power-plant coal consumption of 6,800,000 tons. At the end of 1960, consumption at the power plant will be 8,000,000 tons. If coal used directly for space heating can be estimated at 39,000,000 tons, electric heating already has added 6,800,000 tons at the end of 1959, with the total rising to 8,000,000 at the end of 1960.

"The door to space-heating opportunities has been reopened. Besides the better business you will find beyond it there are also the benefits of a closer working relationship with your best customers, the electric utilities, and the opportunities for that larger service to the American people which ultimately is what every business works for."

Discussion following the presentation brought out general opinion that the rise in electric heating would not displace present domestic tonnage since electric heating goes primarily into new homes where oil and gas otherwise would get the nod.

Coal Activities in Western Europe—Some Observations, T. Reed Scollon, chief, Div. of Bituminous Coal, USBM.

Structural changes in the energy market in western Europe have altered the picture as to imports but still leaves the area needing considerable coal from outside in the near and further future. Factors in this change include the rise of oil and natural-gas competition, political developments, nuclear energy, eastern European coals, and efforts in western Europe to achieve a greater degree of coal self-sufficiency.

Oil and gas from the Sahara at the north coast border could aggregate the equivalent of 105 million metric tons by 1965. West Germany has attempted to limit coal imports by quotas and taxes, and other countries are considering similar steps. Work on nuclear energy is going ahead, though there are rising doubts as to its economic feasibility. And in eastern Europe, Russia and Poland are making great strides in raising coal output and are trying to displace U. S. coal in western Europe, though there is no indication that they can supply the high-grade types available from the U. S. Coal stocks in western Europe continue to rise in spite of attempts to cut back production.

Other factors also are or will affect the energy balance in the future, but there is more pessimism on coal's outlook than heretofore. But it is believed that the U. S. coal tonnage to Europe will be affected more by oil and gas and political-policy developments than by competition from European coals and nuclear energy. And taking everything into consideration, authorities abroad see the low for U. S. coals as 15 to 20 million metric tons, with steel growth a big factor in any pulling up of the level.

The Future of Coal in an Expanding Economy, Stuart T. Saunders, president, Norfolk & Western Ry.

"After our merger with the Virginian we will originate more bituminous coal than any other railroad in the world." Coal progress has been phenomenal. "Indeed, I do not know of any industry in the country which has used technological innovations to greater advantage than the coal industry."

If American coal is kept in a strong competitive position, "the future of the coal industry will be bright, particularly in view of the current expansion of our national economy." Steel and power will lead the list of growing markets, and the relatively new one of overseas exports, despite recent reductions, will continue to absorb a significant tonnage—"probably between 20 and 30 million tons in 1960, remaining at about this level for the next several years. However, this figure may be on the conservative side, and the export market might go as high as 40 million tons . . . "

"Obviously, the future we envision for coal will not come automatically." Costs must be kept competitive, including reduced freight rates where warranted. A national fuels policy to insure that coal gets a fair opportunity, and continued and expanded research are additional needs.

"Our job in the years ahead is to continue to exploit every means at our command to produce and transport coal at the lowest possible cost. If we pursue this objective as relentlessly in the future as we have in the past, I am confident that coal will continue to be the Nation's most-reliable and economical fuel, and that it will be more vital to our national growth than ever before."

White Sulphur Meeting

(*Continued from p 148*)

Recent Experiments in Cementation of Mine Roof with Polyester Resins, Earl R. Maize, USBM, Bruceton, Pa.

The need for better roof control is apparent from the fact that in the first half of 1959 fatalities from falls of roof accounted for 62 out of the total of 110 deaths. This has led to, among other things, study of the possibility of reinforcing roof and adding to its strength by use of a bonding agent. Epoxy resins were the first materials tried. Now work is being done on polyester resins with activators developed by American Cyanamid, which are cheaper, easier to use and have the desired characteristics.

The first step was to determine pressures required to force the material into the strata. Minimum has been 80 psi; maximum, 2,850 to 3,000 in tests so far. At some point under the maximum pressure fracture of the strata occurs. Results of the latest test, involving injecting 775 lin ft of opening with 2,050 gal of polyester resin are not in yet, but mechanical difficulties in injection were such that definitive results are not expected from this test.

In response to questions after the presentation, D. C. McLean, of Cyanamid, noted that little is know yet as to the quantities of material that may be required. If, however, it should be 1 gal per lin ft the cost, including injection labor, equipment, etc., would be $5 per lin ft, compared to $1.50 to $7.50 for conventional support methods.

Foremen's Forum

A Pig Is a Pig Is a Pig

Here is a plea for more plain talk among technical people.

The following describes the activities of five immature mammals of the family of nonruminant artiodactyl ungulates. All five of these may be described as being of less than average magnitude; however no information is given as to the relative size of one with respect to another. Available evidence indicates that the first of the group proceeded in the direction of an area previously established for the purpose of commerce. Data on the second of the group clearly show that, at least during the time period under consideration, it remained within the confines of its own place of residence. Reports received on the activities of the third member of the group seem to show conclusively that it possessed an unknown quantity of the flesh of a bovine animal, prepared for consumption by exposure to dry heat. The only information available on the fourth member of the group is of a wholly negative nature, namely, that its possessions did not include any material of the type previously described as having been in the possession of its predecessor in this discussion. As to the fifth and last member of the group, fairly conclusive evidence points to its having made, during the entire course of a movement in the direction of its place of residence, a noise described as "wee, wee, wee."

Try that one on your two-year-old's piggies. Ten to one you lose your audience before you draw your second breath. Absurd? Then how about this: You are asleep below-decks in a ship in mid-Atlantic. The night is black, the seas stormy. You are suddenly awakened by the crash of alarm bells, hysterical shouts, the pounding of running feet overhead. Panicked, half-dressed, you grope your way through a darkened ship to the deck. All about you are pushing, screaming bodies. The ship is sinking. Then a sign appears in front of you, barely legible in the faint moonlight. Hungrily, you make out the words: "Locations of auxiliary vessels, which are to be utilized by personnel only in the event of the necessity for the abandonment of this ship, are as follows . . ." Before you can read further, the milling mob carries you out of range.

These are two examples of stifled communication. In each case the culprit is overblown language, big words, pompous style, complex syntax, indirection. Does the style sound familiar? It should; most people, especially technical people, seem to fall into that style naturally. Until a few years ago, this was merely unfortunate. We were like the little two-year-old who was deprived of his nursery rhyme. Now, however, we are in the position of the hapless soul on the sinking ship; failure to communicate is a danger, may prove to be fatal.

Progress in every field of human endeavor leans heavily on our ability to tell others what we think and feel, what we have found out, and what we intend to do next. Failure to communicate is at the root of many of our social problems —personal, national, and international. This is fairly obvious. Another word for a quarrel is a misunderstanding.

What may not be so obvious is that failure to communicate is seriously retarding technological progress. Leave aside the fact that engineers and scientists are not able to tell laymen about their findings, their philosophies, their hopes. This is an extremely dangerous situation that has been the subject of countless editorials in the recent past. Beyond that is the sad fact that technical people are unable to communicate among themselves. Scientific knowledge is accumulating faster than we can disseminate or digest it. Fifty years ago this would have been deplorable. Today it is perilous. From all sides we hear that scientific and engineering manpower is in short supply, that the efficient use of what we have may make the difference in our struggle for national survival. At the same time, untold thousands of man-hours are wasted every day in the struggle to wrest meaning from the jargon-infested jungle of our technical literature.

What are the reasons for the high impedance level in technical writing? What can be done to speed the flow of knowledge that is so vital to ourselves and to our nation? There are four basic reasons why we write the way we do. Once we understand these, the cure is obvious.

1. We use big words to impress people.

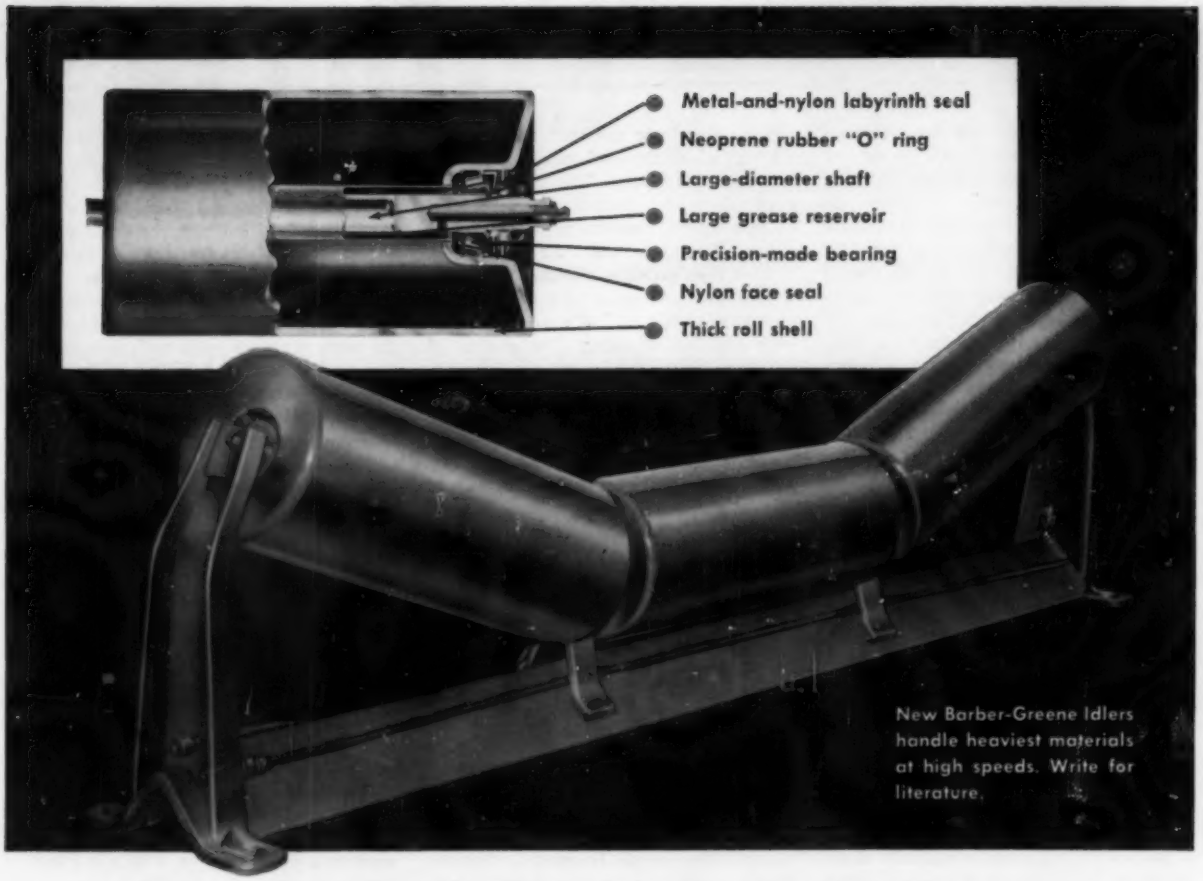
2. We are indirect because it seems more "polite."

3. We use weasel words to hide behind.

4. We use high-blown language because it's easier to write.

(*Continued on p 154*)

This article by A. Q. Mowbray is reprinted for our edification—yours and mine —from the October, 1959, issue of *ASTM Bulletin*, a publication of the American Society for Testing Materials.


Metal-and-nylon labyrinth seal
Neoprene rubber "O" ring
Large-diameter shaft
Large grease reservoir
Precision-made bearing
Nylon face seal
Thick roll shell
New Barber-Greene Idlers handle heaviest materials at high speeds. Write for literature.

Increase idler life with these new heavy-duty Barber-Greenes

Barber-Greene's famous line of belt conveyor idlers has now been expanded to include two entirely new series of heavy-duty units. Both series offer many revolutionary design improvements that assure longer life on every job. Both are built to handle large lumps and heavy materials at high speeds. These new series include a complete range of types for every application.

Important advantages are:

Revolutionary grease seals—The combination labyrinth and face seals are the most advanced in the industry. Made of metal and nylon, they seal grease in . . . dust and dirt out, allowing long lubrication intervals and lengthening bearing life. Neoprene rubber "O" rings effectively prevent moisture from entering bearing.

Rugged end brackets—Die-formed carbon-steel end brackets, twice as strong as castings of the same thickness, are ribbed for greater rigidity.

Precision-made bearings—Tapered roller bearings are precision-made to give many thousand hours of service.

Large-diameter shafts—Shafts, made of special-accuracy cold-drawn steel, up to 1¼" in diameter. They are firmly anchored in stands by sturdy clamps and locking plates.

Virtually unbreakable stands—Jig-welded, all-steel stands maintain roll alignment despite the impact of large lumps. Heavy, inverted base angle is self-shedding. Heavy, formed steel feet up to ½" thick.

Thick roll shells—Rolls made of heavy steel tubing up to ¼" thick. Strong welds completely around roll ends assure rugged, long-life units. Roll edges ground smooth to prevent belt wear.

Large grease reservoirs—Rigidly fitted seamless steel tubing forms large grease reservoir, providing ample reserve which permits longer lubrication intervals.

59-9-1PE

Write for new bulletin.

Representatives in Principal Cities of the World

Barber-Greene BG

Main Office and Plant AURORA, ILLINOIS, U. S. A.

Plants in DeKalb, Illinois..Detroit..Canada..England..Brazil..Australia

CONVEYORS . . . LOADERS . . . DITCHERS . . . ASPHALT PAVING EQUIPMENT

Foremen's Forum (Continued)

Big Words—People may be impressed by big words, but we should be writing to inform them, not to impress them. Just because our subject matter is serious, just because we are professionals writing for professionals, is no reason for us to get up on our high language horse. We should not fear that we may seem to be talking down to our readers. A Ph.D., no less than plain folks, appreciates plain talk. The urge to break out into fancy language may be a hangover from the days when the Fourth-of-July orator was much admired by the voters for his ability to disgorge great streams of polysyllabic profundities in a gaudy display of verbal pyrotechnics. It went well with the fireworks. Much smoke was generated; very little light was shed on anything. The truth of the matter is that the short, plain word is usually better than the long one. It is usually less abstract, more concrete, has greater impact. It tells the story faster, more accurately, with less wear and tear on the reader. Mark Twain once said, "I never write 'metropolis' when I can get the same price for 'city.'" Let us heed his tongue-in-cheek message.

Indirection—Somehow, we shy away from putting the plain, open truth down on paper for all to see. We would rather hedge the truth about with fancy words, veil its nakedness with misty abstractions. A man writes a letter; "Dear Sir: We regret to inform you that the widgets you ordered are temporarily out of stock. As soon as they become available we shall be happy to accommodate you." It's a little minuet in words—a dancing and mincing about on the fringes of truth with "polite" expressions designated to hide the kernel of truth that is buried there. Why not write: "Dear Sir: I'm sorry, we have no widgets in stock right now. We'll have more in about a week, and we'll send them to you then." Too blunt? Hurt your sensitivities? Let's learn to face the facts. It will save everybody a lot of time.

Weasel Words—This sickness is closely related to the one we just discussed. The difference is that we use indirection out of a vague fear of hurting the reader's feelings; whereas we use weasel words out of a fear of revealing ourselves. Writers of technical papers, in particular, quail at the thought that they may be accused of leaving a stone unturned, failing to consider all the angles, being less than perfectly objective, or drawing a conclusion that is unwarranted by the evidence. All these are, of course, sins. But in giving the appearance of avoiding them, writers qualify, modify, water down, temper, limit, hedge about, and throw up a dense smokescreen of words through which the truth can be seen only with great difficulty. "All the available evidence appears to indicate that . . ." "The tentative conclusion, based on the data presented, is that . . ." "While it has not been possible with the results obtained herein to arrive at a definite conclusion as to the . . ." We are all familiar with this sort of thing. The shelves of our libraries sag under the weight of it.

The Easy Way—It may seem a paradox, but it is nonetheless true that high-blown language is easier to write than simple, direct language. Indeed, one of the definitions of poetry is economy of expression—saying the most with the fewest words. Look at any of the masterworks of the English language, and you will find use of the shortest, most direct word to express the thought. The Bible is an outstanding example of this—the words are simple, clear, beautiful; the thought is profound. Churchill did not promise his people "dangers, exertions, difficulties, and anxieties." He worked a little harder on what he had to say and came up with "blood, toil, sweat, and tears."

The reason complex language is easier to write than simple language is that the longer words are usually more vague, more abstract—if you use them, you don't need to be so precise. You can let the words flow without making the distinct effort needed to find out just exactly what you want to say. Thus: "The results indicate that the effect of the type of surface treatment utilized in this investigation is to mitigate the detrimental effects of stress concentrations on fatigue strength." Abstractions such as "effect," "surface treatment," "investigation," "detrimental effects," included in the same sentence with such monstrosities as "utilized" and "mitigate" are almost too much even for the reader whose life depends upon knowing the result. How much is lost to science by simply saying "These tests show that shot peening increases the fatigue strength of notched steel bars"? Help save the life of that poor wretch on the sinking ship. Put up signs saying "This way to the lifeboats." Remember, too, that all your readers may not be drinking your words with quite as compelling a thirst.

In summary—Write to inform your reader, not to inflate your own ego. Use the short, direct, concrete words that tell exactly what you mean. Be direct. Don't fear that by telling the naked truth you will step on somebody's toes. Let them know the truth. The truth will set them free. Don't weasel. Find out what you want to say, and say it. Don't veil imprecise thoughts in cloudy abstractions. Work at writing. Give at least as much effort to the report as to the project itself. You will be twice blessed.

Join the Safety Crusade

WE HAVE THE KNOW-HOW to control roof hazards—all we need to do is apply it. The 1960 National Campaign to Prevent Injuries From Roof Falls in Coal Mines is designed to focus attention on the No. 1 Enemy in coal mines, falls of roof. The goal during the campaign year, Jan. 1 to Dec. 31, 1960, is a reduction of 50% or more in the frequency of roof-fall injuries. The ultimate goal is to eliminate all injuries from this cause.

All underground coal mines, regardless of size or affiliation, are urged to participate in the campaign. Your federal or State mine inspector will soon visit you—perhaps he already has done so—with the necessary information on how to enroll in this worthy cause. The only requirements for participation are: (1) companies operating two or more mines must enroll each mine separately, (2) each participant must agree to furnish a simple report of injuries resulting from falls of roof, rib or face for one of the three calendar years prior to 1960 and (3) each participant must furnish similar reports covering the first 6 mo of the campaign and the last 6 mo.

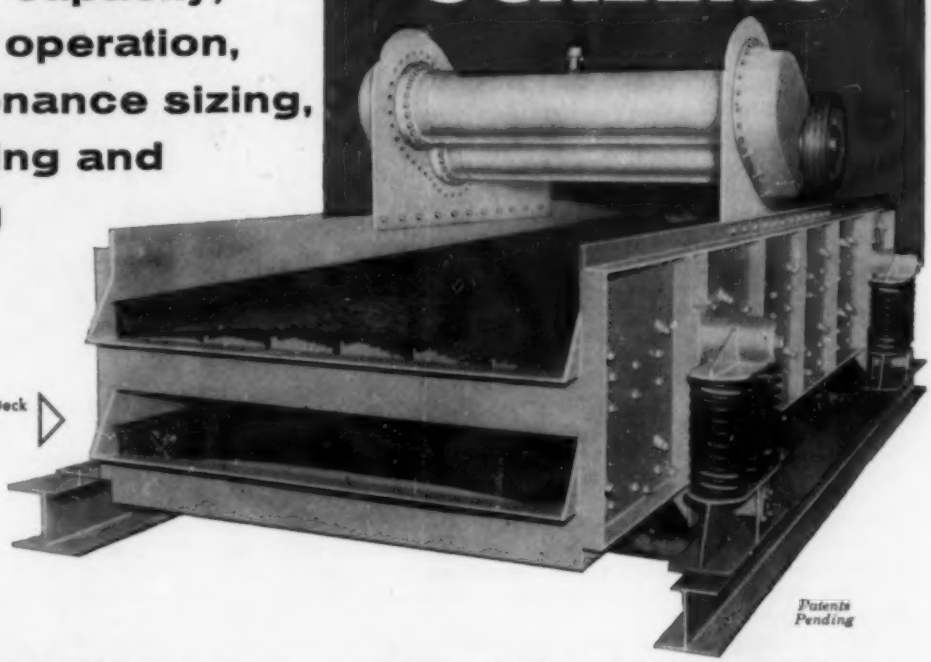
Promotional material may be purchased at reasonable prices from the National Safety Council, and awards of recognition will be provided the men, supervisors and mines that achieve their safety goals. Each mine will compete against its own past record only.

This campaign is a big challenge to foremen. When the record is finally written at the end of 1960 a lion's share of the credit will go to the workmen and their immediate supervisors. We assume that active participation in the campaign will result in an enviable record. Such was the case in the last campaign which ended Jun. 30, 1958. At that time, the mines which had participated and had fulfilled all requirements on reporting their experience posted a record showing a 39% reduction in the frequency of roof-fall injuries.

LECCO VIB

HORIZONTAL VIBRATING SCREENS

for high-capacity, non-stop operation, low-maintenance sizing, dewatering and conveying



6' x 16' Double Deck
Model 02-24

Patents Pending

When a Lecco Vib Horizontal Vibrating Screen is on the job, you know you're getting accurate performance under a wide range of operating conditions whether screening from the coarsest to the finest feeds. That's because the Lecco Vib Horizontal Vibrating Screen is designed and built with superior construction which eliminates adjustment and maintenance slowdowns and stoppages. Each recommended Lecco Vib receives personal attention to screening requirement based on proven methods of calculations.

The new Lecco Vib Horizontal Vibrating Screen literally abounds with exclusive features that make it the economical standout of screening equipment for the modern preparation plant, both as to performance and maintenance requirements.

To assure non-stop operation continuously, the Lecco Vib Screen is *base mounted* or cable suspended, when required, without loss of the dampened start and stop control. Thus, vibration is confined entirely to the vibrated frame and not transmitted to the supporting structure and other equipment.

Vibration absorption is pin-pointed to the coil springs installed at each corner of the unit to support the vibrated frame on its base. Friction checks are provided to eliminate erratic motions of the Screen when starting and stopping. Heavy duty plates of the decks are ribbed and stiffened to withstand the abuse of heavy high-capacity loads and vibration.

Exclusive adjustable trunnions position the coil springs of the Lecco Vib to the desired angle of material flow.

Then too, special feed boxes, which allow full advantage of total screening area are built into the side plates of the Screen as an integral part of the main frame.

For complete information about the Lecco Vib Horizontal Vibrating Screen write for your copy of Bulletin L-12-59.

Lecco Machinery and Engineering Co.

BLUEFIELD, WEST VIRGINIA

Subsidiary Fairmont Machinery Company

Operating Ideas

Tips For Better Locker Installations

By C. D. Cannon
Manager, Engineering Services
Penco Div., Alan Wood Steel Co., Oaks, Pa.

LOCKERS are too often thought of as vertical boxes with doors and too little attention is given to functional locker arrangements. You can realize a number of benefits by "customizing" your new locker installation. These benefits include better sanitation, locker ventilation, better employee morale and property protection.

Essentially, lockers are made by assembling a number of basic parts, such as doors, bases, tops, panels and so on. By applying your ingenuity in selecting the components used in your lockers, you can achieve a "customized" installation.

Here are ten ways you can customize your locker installation to get these benefits:

Sloping Tops—Where locker-room appearance is important, you can benefit by specifying sloping tops. These sloping tops help prevent the accumulation of dust and debris common with flat tops of standard locker units. Thus they promote better housekeeping.

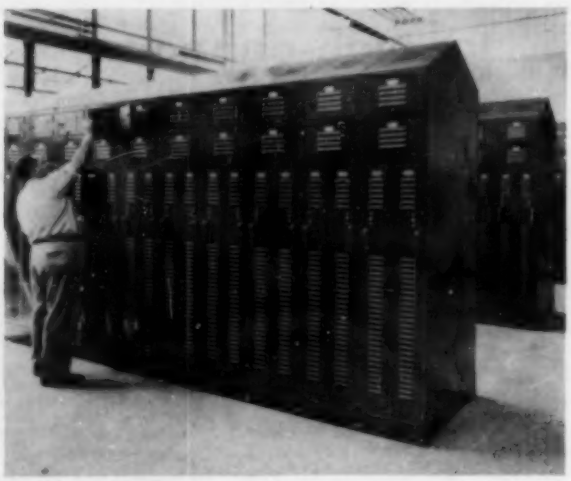
Closed Base—You can eliminate the dirt-catching area under conventional lockers by adding a steel base enclosure to cover the open space beneath. This also gives the installation a neat, flush-front appearance.

Raised Concrete Base—In locker rooms where floors are mopped or hosed, lockers can be protected from moisture and dirt by mounting them on a concrete base instead of on the standard steel legs. Raised concrete bases provide a neat appearance and add stability and rigidity to locker installation.

Filler Panel—In many areas where locker assemblies are located there are building columns or other obstructions which interfere with the arrangement of lockers in orderly, continuous lines. Steel panels that match the lockers can be used to fill openings around these obstructions.

Recess Trim—Where lockers are recessed into walls there is a gap along the top and ends between the edge of the recess opening and the lockers. If left uncovered, this gap makes the installation unattractive and hard to keep clean. This gap can be covered with strips of molding trim held in place by recess trim clips.

Louvers—Openings in standard lockers are often inadequate to provide enough circulation to keep work clothes dry and



fresh. But doors can be produced with louvers extending the full length to provide more circulation.

Mesh Doors—A maximum of air and light is admitted through doors fitted with panels of expanded metal mesh. Furthermore, mesh doors make possible easy inspection.

Perforations—Additional air circulation in non-recessed lockers can be provided by perforations in backs and tops. These openings generally are ½-in holes on 1-in centers and grouped in rectangular units of about 42 holes each.

Vertical Partitions—Where work clothes are placed in the same locker with street wear, the clean clothes are often soiled by coming in contact with the dirtier ones. To overcome this problem, lockers can be furnished with full-length vertical partitions extending from the back almost to the door. Partitioned lockers are good morale builders.

Locks—By selecting the type of lock to match your particular requirements, you can improve appearance and convenience in addition to providing protection and control over locker contents. Standard lockers are equipped with door handles into which padlocks can be inserted. Most manufacturers are also prepared to furnish doors with built-in combination or key-operated locks. Both types are usually master-keyed so they can be opened for inspection.

Standardized, built-in locks make locker installations look neater than an assortment of padlocks provided by individual occupants and also eliminate the problem of lost locks.

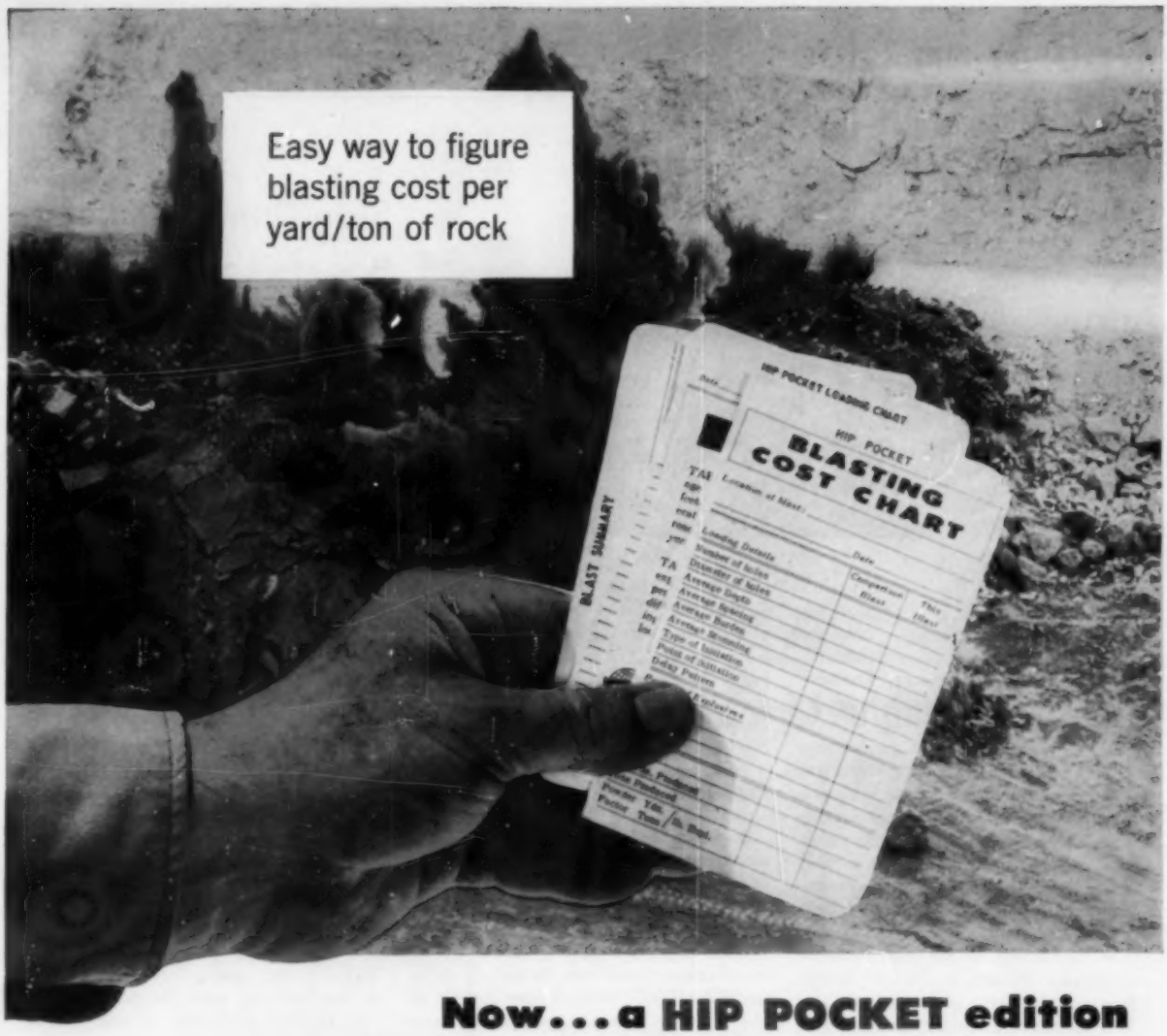
Foam Injection Increases Blasting Safety

RECENT RESEARCH in England has shown that safety in shotfiring can be greatly increased if foam is injected into the shotholes before they are tamped, according to *Colliery Guardian*, October 22, 1959.

One of the hazards of shotfiring is methane seeping into the holes through cracks which may have developed during cutting or drilling. If foam is injected under pressure into the drillholes, it will disperse any methane which may have accumulated in the holes. And by percolating into any cracks which may have developed between holes the foam acts as a barrier against any further seepage before shots are fired.

An injector, developed by R. V. Hawks, delivers the foam to the holes. The device includes a hand pump, reservoir cylinder and an infusion gun. The cylinder contains the liquid which produces foam when mixed with air. Air is forced into the cylinder by the pump and the ensuing mixture is forced out through a siphon tube.

The liquid in the container is a solution of 3% foam-making compound to 1 gal of water. The injector operates at about 20 psi which is sufficient to overcome any backpressure in the back of the hole. A rubber expansion sleeve on the infusion gun acts as a sealing gland when the gun is inserted in the hole. This seal ensures that pressure in the hole is maintained while foam is forced into the strata around the hole.


Easy way to figure blasting cost per yard/ton of rock
HIP POCKET LOADING CHART
HIP POCKET
BLASTING COST CHART
BLAST SUMMARY

Now...a HIP POCKET edition of the Atlas BLASTING COST CHART

Here's a new 1959 Atlas Blasting Cost Chart that goes right out on the job with you—helps you record the cost data you need to protect your profits.

The original Blasting Cost Chart, with instruction book and Slide Rule, is being used successfully by hundreds of operators. Now, to make it more convenient, Atlas has added this "hip-pocket" edition. With it you can compare results from blast to blast to determine methods that pay off best. It helps you assemble quick cost facts on drilling, secondary breakage, digging, hauling, and crushing.

Your Atlas representative will be glad to show you how to use the new "hip-pocket" Cost Chart. He has a kit full of information that may help reduce your costs and protect your profits. Ask him for details, or write us direct.

EXPLOSIVES DIVISION
ATLAS
POWDER COMPANY
WILMINGTON 99, DELAWARE
Offices in principal cities

Ask your Atlas representative to show you the electric match demonstration . . . See why Atlas E. B. Caps lead the field in dependable performance.

Operating Ideas (Continued)

GREATER productivity with side-dump bucket results from shorter cycle time. Loads can be dumped without turning machine. Operator fatigue is lessened.

Side-Dump Bucket Boosts Loader Efficiency

LOWER COSTS and increased production are frequently possible through use of a side-dump bucket on a front-end loader. But the side-dump unit was designed for certain jobs and, like any specialized tool, performs best under certain conditions.

Why is it possible to get greater productivity with a side-dump bucket? First, the maneuvering of a machine such as a Caterpillar Traxcavator is considerably reduced, thereby shortening cycle times. Loads can be dumped without turning the machine; thus lowering travel distance and shifting time. Operator fatigue is also lessened.

The side-dump bucket also increases productivity through its bucket design, which usually has a wider opening that makes possible a bigger heaped load. Side-dump buckets hold more because of an extension on the side.

Another reason for its superior performance is the smaller space required for loading. Truck loading in cramped places, such as narrow strip pits and some stockpile areas, often presents a problem. Front-end loaders with side-dump buckets do not need as much maneuvering area, thus trucks can get in close to the work.

Here are a few tips for getting the most out of a side-dump bucket.

1. Set the automatic lift kick-out mechanism just high enough to dump effectively into the truck. This will cut time from excessive lift heights.

2. Spot the truck the same distance it takes for the hydraulic system to lift the bucket to dump height. This is usually about 1½ times the length of the machine. Less maneuvering time makes possible faster dumping.

3. Start dumping as soon as the truck body is reached.

4. Pass as close to the truck as possible.

5. "Cock" the machine slightly toward the truck when dumping the last load or two. This throws the load to the center and opposite side of the truck and gives even load distribution.

6. Save time on bucket control movements after dumping. Shift to forward position before returning bucket from dumping position. Side-dump and bucket-tilt controls can be operated together to bring the bucket to digging position while at dumping height and while moving to the digging point.

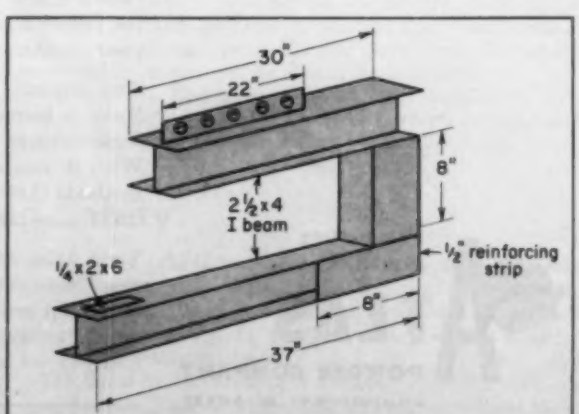
7. Keep forces on the bucket directed into its supporting saddle. Avoid back dragging and prying action that pulls the bucket away from the saddle.

8. Increase production as well as stability with a ripper, which can provide a counterbalance and loosen hard material for easier handling.

How to Handle Heavy Pipe

HANDLING sections of heavy, large-diameter concrete pipe is no longer a hard, unpleasant job at Alabama Power Co., Gorgas, Ala. As a result of a suggestion by Lua Thompson, Gorgas truck driver, the company now uses a special pipe handling device that enables two men to do as much work as four or five did previously.

The device, which was made at Mr. Thompson's suggestion, is a U-shaped member that is slipped over the edge of a section of pipe so that it can be picked up by a power winch on a truck. One leg of the U is 37 in long and the other is 30 in. Both legs are made of 2½x4-in I beams which are welded to an 8-in base. The longer leg, which is placed inside the pipe, has a piece of ¼x2x6-in steel welded to the end to prevent the pipe from slipping as it is raised. The shorter leg has five different holes which may be used to provide a selection of lifting points. The lifting point chosen depends on the diameter of the pipe. By choosing the correct lifting point various sizes of pipe can be handled without the danger of their slipping from the device.



Alabama Power uses a D2 tractor with an A frame and winch, and the device to pick up pipe from the supply yard and place it on a truck for delivery to a construction site. The tractor and device also are used to unload the pipe at the construction site and place it in the ditch.

ECONOMIZE

with built-in REOPCO*

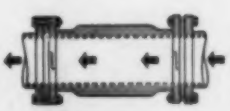
Massco-Grigsby Pinch Valves

...their Long Wearing Life makes them

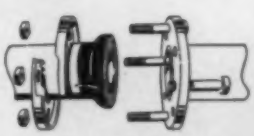
Cost Less to Own!

- **Rubber or Neoprene sleeves for abrasive and corrosive pulps and liquids**
- **1" to 14" inside diameter**
- **Pressures to 150 psi.**
- **Temperatures to 200° F.**
- **Manual or power-operated closing mechanisms**
- **Automatic regulation and remote control available.**

Patented "hinged" sleeve. Recesses serve as "hinges" during compression; reduce strain and permit tight closing.



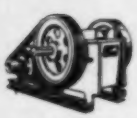
Unobstructed flow eliminates high friction loss.



Split flanges and Flex Seal ends assure perfect seal.

*Reduced operating costs.

and Laboratory Equipment, too



4" x 6" Massco Laboratory Jaw Crusher

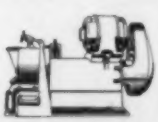
Welded steel frame; manganese steel jaw and cheek plates; bronze bushed bearings; smooth jaws give better product and easier cleaning. Adjust for plate wear and product size by convenient hand wheel adjustment.

6" and 10" Massco Gy-Roll Reduction Laboratory Crusher

Reduces ½" feed to as fine as 10 mesh in single pass. High capacity, low power consumption.

Laboratory Crushing Rolls

Sizes (Diameter x width): 8" x 4", 10" x 6", 10" x 8", 12" x 10" and 12" x 12". Adjustable roll space setting up to ¾". Double V-belt drive. Heavy, cast Meehanite frame absorbs vibration, results in long life.



Massco-McCool Pulverizers

Disc type grinder with a planetary movement. No gears. Will grind to 150 mesh in one pass.

WRITE FOR CATALOGS

Manufacturing Division

MINE AND SMELTER SUPPLY CO.

DENVER 16	NEW YORK 17	SALT LAKE CITY 1	EL PASO
3800 RACE STREET	122 E. 42nd STREET	121 W. 2nd S.	1515 11th AVE.

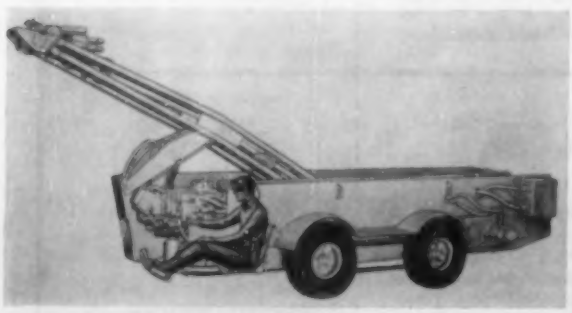
LICENSED MANUFACTURERS AND SALES AGENTS in Canada, Australia, Sweden, England, South Africa

SALES AGENTS in Peru, Chile, Philippine Islands, Japan, New York City (for Continental Europe) and in principal cities of the U. S.

Equipment Developments

Haulage Train

"Wagon Train on Rubber" is the name given by Differential Co., Findlay, Ohio, to its latest entry in the field of dump-truck haulage. These trains, made up of a "powered wagon" and one, two or more trailers, come in sizes for highway use with 15-ton capacity bodies and a larger off-highway train with 25-ton capacity bodies. A solenoid valve on each body is controlled from the cab so that the driver can dump the load without leaving the cab. A reduction in cost, says the firm, is accomplished in three ways: convenient dumping without stopping; increasing the load hauled and placing the dumped load clear of the roadway; increasing the ratio of payload to tare weight. Wagon engines have highest horsepower, Differential declares, and as many trailers can be hauled as the steepness of the road grade permits. All-welded construction and use of light-weight high-strength aluminum alloy provide weight savings. Three bodies can be dumped in less than 30 sec, adds the company.



Improved Roofbolter

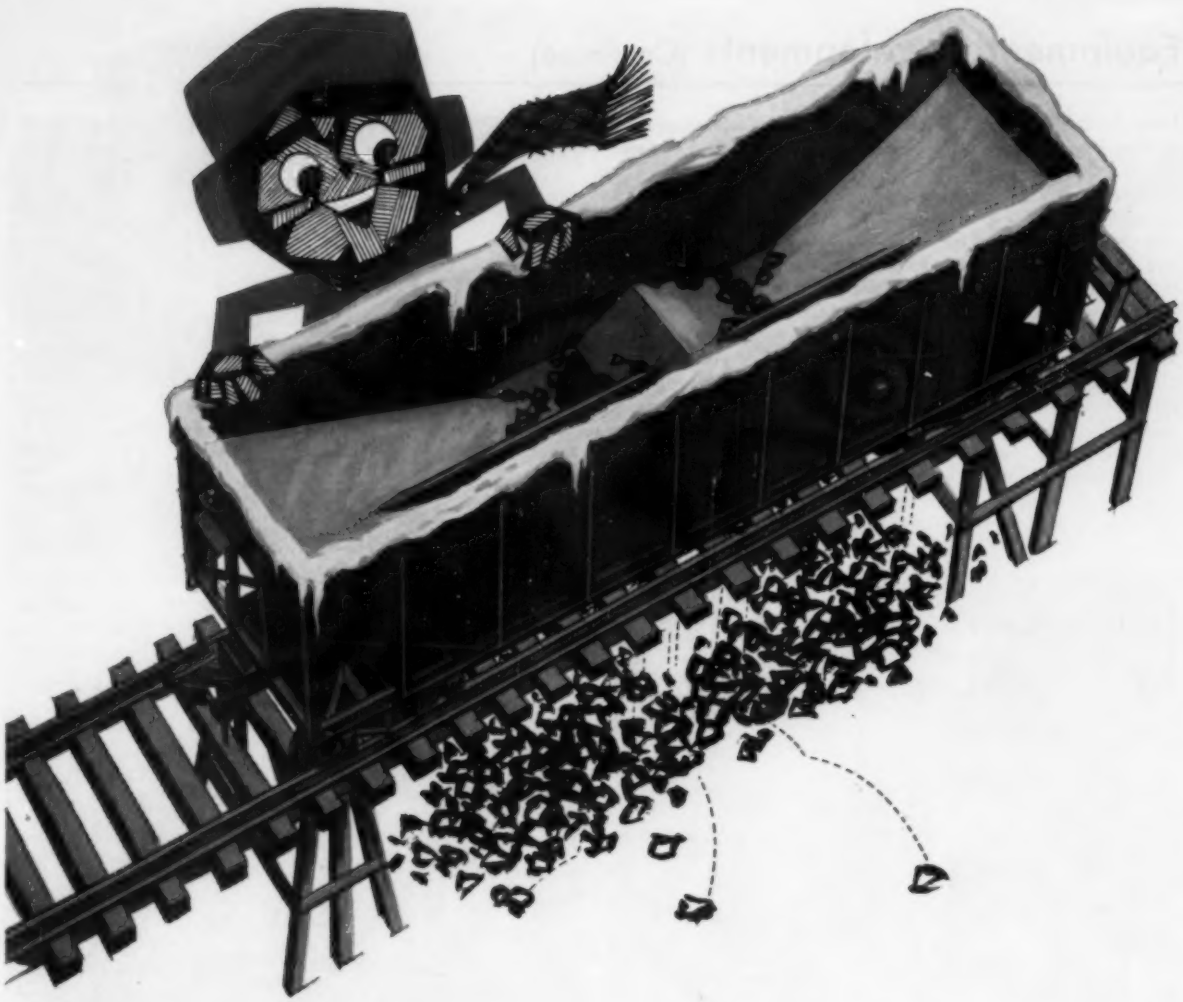
Model 320 DC Roofmaster, now incorporating rotary percussion and eliminating pneumatic tools in roof drilling, provides extended bit life and fast economical drilling in the hardest sandstone without air, reports the manufacturer, Galis Electric & Machine Co., Morgantown, W. Va. The 4-wheel drive, rubber-tired machine has 8-in ground clearance and variable tram speed to 200 fpm. A three-point suspension system permitting rotation about its own center of gravity gives the crawler-type drill maneuverability, making possible quick spotting of holes, notes the firm. A 4-ft movement of the drill head can be made quickly and easily, it notes. Variable-thrust torque to 8,000 lb and up to 473 rpm plus variable percussive force and frequency produce the best combination for maximum penetration in any rock formation, declares Galis. An 84-in feed length combined with a 6½-in head thickness makes it possible to drill 6½-ft holes in 7-ft coal with no drill changes. A Bureau of Mines-approved dust collection system draws the dust by vacuum through the hollow-drill steel via hose to a collection box. All controls are mounted so the seated operator can reach them while starting his steel at any location.

Tractor Shovels

The Yale & Towne Mfg. Co., Batavia, N. Y., has out two new Trojan tractor shovels. Model 134 (photo) has a lifting capacity of 8,000 lb, and a selection of buckets of 1-, 1⅛- and 1⅜-yd capacities is available. The tractor shovel has a dumping clearance of 10 ft-2 in under the bucket hinge pin, and 8 ft-8 in under the bucket cutting edge. Larger Model 164 has a lifting capacity of 10,000 lb and a bucket selection including 1⅛, 1⅜ and 2 cu yd. Dumping clearance is 10 ft-3 in under the bucket hinge pin and 8 ft-6 in under the bucket cutting edge. Both models are available with either gas or diesel power and have full power shift 3-speed transmission and a 3.5:1 torque multiplying torque converter. Styling features include recessed headlights and panoramic instrument panel.

Belt-Idler System

It is now possible, reports Manhattan Rubber Div. of Raybestos-Manhattan, Inc., Passaic, N. J., to successfully use 45-deg troughing idlers for carrying all materials with its Ray-Man conveyor belt. Although conventional belts have



freezeproof...with Ashland **Permatreat** Coal Spray Oil!

Saves time and coal cash by eliminating frozen car pockets! Coal sprayed with Permatreat resists freezing, and becomes weatherproof, waterproof, windproof, dustproof and non-corrosive.

plus **— REFINERY-CONTROLLED QUALITY.** With Ashland Permatreat, you're assured of product uniformity. Permatreat is quality controlled and carefully refined to meet the needs of your operation.

plus **— TECHNICAL AND RESEARCH SERVICE.** Helpful technical and research services are available to you from our nationally recognized specialists in oil treating of coal.

plus **— CONVENIENT SUPPLY POINTS.** Large dependable storage facilities located near the coal fields assure uninterrupted supplies of Permatreat for immediate delivery by transport truck or tank car.

ONE **Permatreat**MENT LASTS THE LIFE OF THE COAL!

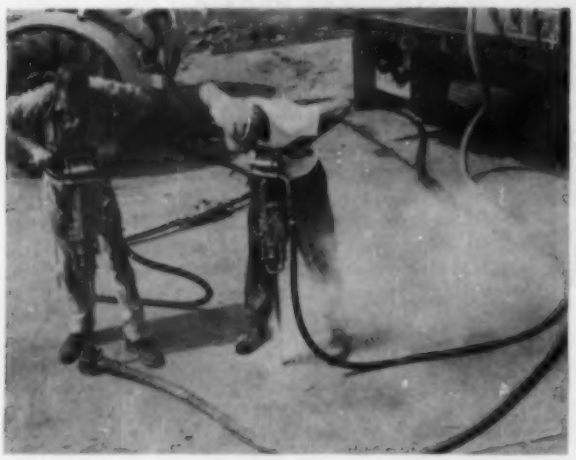
For immediate service call any of these convenient Ashland Oil offices.

Ashland Ky., EAst 4-1111
Beckley, W. Va., CLifford 3-6687
Canton, O., GReenwood 7-4565
Columbus, O., AMherst 8-9419
Kuttawa, Ky., Phone 5501
Louisville, Ky., SPring 6-4631
Pittsburgh, Pa., FRemont 1-7314

Ashland PERMATREAT

ASHLAND OIL & REFINING COMPANY, Ashland, Kentucky

been confined mostly to 20-deg idlers the advantages of 45-deg idlers have long been recognized, declares the firm. W. L. White, Manhattan's technical consultant notes: "Every engineer knows that a conveyor belt has much greater hauling capacity with 45-deg idlers than with 20-deg idlers. But engineers also know that the sharp angle between concentrating and center rolls makes conventional slab belts difficult to train under heavy load, and flex-fatigue causes ply and cover separation." Ray-Man construction is compensated so that the outer ply stretches as the inner ply contracts under both lateral and longitudinal flexing and even on reverse bends. The outer-strength member plies are constructed with a special weave high-strength synthetic fabric of controlled elasticity relieving stress on the belt as it travels, adds the firm. To back up its claims for performance and reliability, notes Raybestos, it will offer a guarantee against ply or cover separation at the idler hinge line when it is used with troughing idlers set at any angle up to 45 deg.



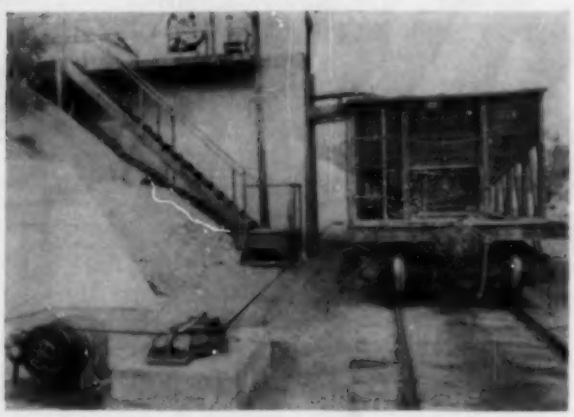
Dustless Drilling

A newly-developed dust-collecting system for use with hand-held sinker drills is being marketed by Le Roi Div., Westinghouse Air Brake Co., Milwaukee 1. It can be used with any brand of rock drills, according to the manufacturer. Dust and cuttings are trapped by a collar that fits around the drill steel and are "inhaled" through a connecting hose to a Le Roi DK280 dust-collecting tank. The tank can be mounted on any compressor-carrying truck, portable compressor or Le Roi's combination tractor-compressor, the Tract-air. The DK280 has a big 23-in wide, 16-in long and 7-in deep drawer that pulls out easily for disposal of dust and cuttings.

New Diesels

A new line of diesel engines specifically built to provide low-cost efficient operation in light and medium trucks has been announced by Hercules Motors Corp., Canton 2, Ohio. While designed mainly for automotive application, the diesels, ranging in size from 50 to 350 hp in 3-, 4-, 6- and 8-cylinder models, will find use in a wide variety of materials-handling and industrial applications. The diesels are said to be light in weight, short in length and carry a low price tag. For heavy trucks, Hercules has engines ranging from 200 to 350 hp with load capacities up to 76,800 lb gross combination weight. Outstanding among these is said to be an all-aluminum

2,600-rpm V-8 engine weighing 1,450 lb, with a rating of 225 hp. Four new engines employ a special alloy insert in the combustion chamber permitting the use of almost any hydrocarbon for fuel. No adjustments are necessary to change from one fuel to another, it is pointed out.



New Car Puller

No. 14H car puller developed by Stephens-Adamson Mfg. Co., Aurora, Ill., brings the power of a locomotive to one-man car spotting while affording greater safety to operators, declares the firm. There are no ropes to snub as the wire rope dead ends directly into the drum. A heavy-duty clutch operated by a hand wheel permits the drum to be released and turn freely, paying out the rope. Unlike other car pullers, the machine does not require the operator to maintain tension or coil rope, according to the firm. The machine is totally enclosed, fully protecting the operator from moving parts.

Faster Flocculation

Separan AP30, a new flocculation agent now offered by Dowell Div. of the Dow Chemical Co., Evansville, Ind., can achieve settling rates of 20 to 25 fph at concentrations between 0.01 and 0.20 lb per ton of solid, according to the firm. Clarification of wash water is so complete, it is noted, that contamination ceases to be a problem, and usually, water may be reused many times without solid build-up. Different application techniques are recommended.

B.F.Goodrich

B.F. Goodrich tires carry 44-ton gross loads for strip miner, still can be retreaded twice

J. Robert Bazley, Inc. of Pottsville, Pa., strip mines throughout the anthracite region, also builds roads all over the state. The company operates 217 rubber-tired vehicles working as many as 70 hours a week. The truck above carries 22 tons of rock and dirt overburden. Add the vehicle weight, and you have a 44-ton gross load for those tires to carry over razor-sharp rock!

Yet the tires can be retreaded *twice!* This is possible because the tires are B.F.Goodrich Rock Service tires—specially built for this kind of work. Massive double-chevron cleats defy rock cuts and bruises, pull in forward or reverse. B.F.Goodrich FLEX-RITE NYLON cords withstand double the impact of ordinary materials, resist heat blowouts and flex breaks. Result: this B.F.Goodrich Rock Service tire body outwears even the extra-thick tread, can be retreaded again and again!

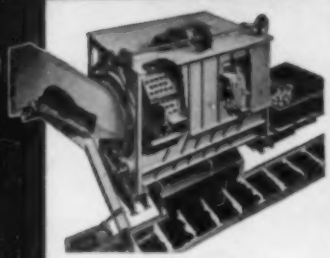
Follow the lead of successful strip miners like J. Robert Bazley. Switch to B.F.Goodrich Rock Service tires. You'll be dollars ahead. Your B.F.Goodrich Smileage dealer is listed under Tires in the Yellow Pages of your phone book. See him today. *The B.F.Goodrich Co., Akron 18, Ohio.*

Specify B.F.Goodrich tires when ordering new equipment

Smileage!

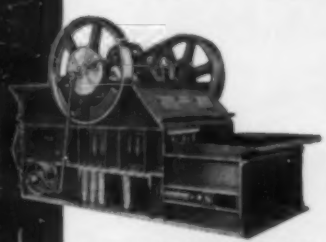
B.F.Goodrich *off-the-road tires*

America's most complete line of CRUSHING EQUIPMENT



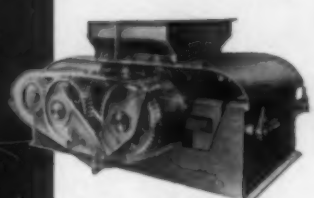
McNally Pittsburg Rotary Breaker

This unit allows positive control of top size in handling run-of-mine washery feed. Production of fines is held to a minimum.



McNally Norton Vertical Pick Breaker

50% Less fines when reducing lump to egg and stove sizes.

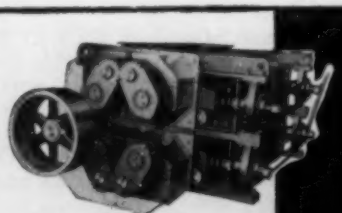


McNally Double Roll Gearmatic ROM Breaker

Built in tonnage ranges from 750 tph to 1400 tph. Full floating gearmatic drive.

McNally Gearmatic Stoker Coal Crusher

This unit offers three prime advantages: high volume production, plus accurate sizing, plus low percentage of fines.



McNally Two Stage Crusher

This unit consists of a double roll primary crusher mounted above a double roll secondary crusher—compactly arranged into a single rigid structure.

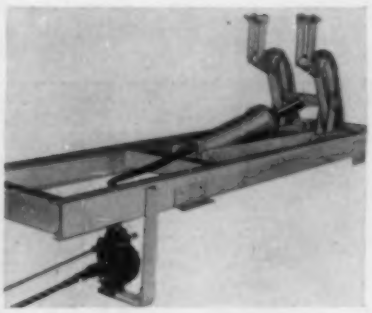
Available From Stock and on Short Delivery

For immediate action on complete information write, wire, or call

McNALLY PITTSBURG MFG. CORP.

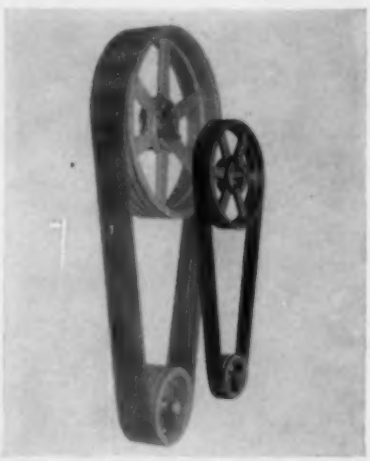
Pittsburg, Kansas Wellston, Ohio

Equipment News (*Continued*)

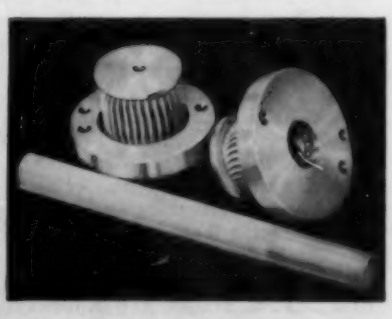


NEW HOIST – A single-cylinder 8-in underbody hoist that will haul and dump up to 18¾ tons of material under normal conditions is being marketed by Marion Metal Products Co., Marion, Ohio. The model, HD-829, is designed for use on tandem trucks and has ample capacity to do heavy-duty work, says the firm. New quality features include large strong lift arms made of cast alloy steel heat treated to withstand wear, and all-welded frame with box-type cross members.

WHEEL LOADER – Two types of transmissions are available with Model TL-14 TractoLoader made by Allis-Chalmers Mfg. Co., Deerfield, Ill. The user can get either the Allison transmission or the new Tractomatic power reversing transmission. The company remarks that the 4-speed Tractomatic transmission reduces initial capital outlay for a wheel loader without sacrificing essential advantages of the Tracto-Loader line. It adds that no matter which transmission is selected Model TL-14 comes with an automatic clutch cut-off which has the effect of placing the transmission in neutral and thereby diverting full engine power to the hydraulic system at the touch of the brake pedal. The 5,300-lb carry capacity unit is available with six buckets ranging in size from 1 to 3 cu yd.



DRIVES—With compact packages made possible through high-strength belts and sheaves, its "Ultra-V" drives are capable of handling up to three times the horsepower of conventional V-belt drives in the same space, reports T. B. Wood's Sons Co., Chambersburg, Pa. With Ultra-V, the number of belt cross-sections is reduced from 5 to 3. The entire range of drive requirements from 1 to 1,500 hp is covered by these cross-sections: 3V—$\frac{3}{8}$x$\frac{5}{16}$ in; 5V—$\frac{5}{8}$x$1\frac{7}{32}$ in; and 8V—1x$\frac{7}{8}$ in. Modern synthetic fibers and rubbers provide the belts with strength and prevent belt shrinkage. The deep, narrow belts have greater side-wall area for transmission of power.



SMALL FILTER—A filter with a relief valve, said to be the world's smallest precision filter, is being produced by Aircraft Porous Media, Inc., Glen Cove, N. Y. The unit, weighing only 1.18

Bethlehem Guard Rail, Design 745, is one-piece type for use with wood ties. No loose parts such as clamps, bolts, braces are required. Furnished complete with foot-guards, ready for installation.

Good trackwork is a lot more than just track

Bethlehem Compromise Joint, Design 976, also called "offset splice bar," is forged and machined from heavy bar stock, for connecting rails of different section, or rails of same section but of different joint drillings.

Bethlehem Hook Twin Frog Plates give stronger "grip" on rail base, distribute track motion over broad tie area, remove direct pull from spikes which anchor the plate. Used in pairs, they are easily adapted to any frog position or angle.

A really efficient track system embodies, first of all, sound and experienced planning—an area in which Bethlehem stands at the top of the heap.

In addition, it takes a lot of "little things" to make a smoothly operating haulageway. Little things like frog plates, compromise joints, heel blocks, and all the other unobtrusive accessories of modern trackwork.

Bethlehem engineers will be glad to look over your workings to determine where and how these important accessories might spruce up your haulage track and lower your maintenance costs. Just call or write to the nearest Bethlehem office. Or to the address below.

Bethlehem Switch Heel Block Joint, Design 992, helps maintain heel spread and track gage at the heel end of the switch. Keeps closure rail and switch point correctly aligned, vertically and horizontally.

BETHLEHEM STEEL COMPANY, BETHLEHEM PA. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

NEW! **Reversible Ratchet BIT WRENCH**

SPEEDS BIT CHANGING ON CONTINUOUS MINERS AND CUTTING MACHINES

. . . for all machines using ¾" set screws.

- **Ratchet reverses to change direction of stroke in an instant.**
- **No removing of wrench to loosen or tighten set screws.**
- **Solid forged steel handle, withstands extra rough treatment.**
- **Savings in bit changing time quickly return cost of wrench.**

PAT. PEND'NG.

Wrench is 18⅝" long for plenty of leverage . . . works where side clearance is only ½".

Solid box-end wrench at the back provides for "sledgehammer" jobs where set screws are irretrievably "frozen" . . . assures access to set screws in extremely awkard locations. Send for Literature and Prices.

Manufacturers of Mining Machinery Parts Design and Engineering Service Available

NORTH AMERICAN GEAR COMPANY

39 East Campbell St., Blairsville, Pa.

Equipment News (*Continued*)

ounce, is rated at 2 microns and at 15 microns absolute. It is designed to operate at 0.3 gpm under normal conditions and 0.8 gpm under intermittent surge. The company says the filter can be used with fluids, including corrosives and with gases.

AUGERING—"PolerBore" auger, made by Trainer Associates, Inc., New Castle, Del., uses special cutting tooth setting aids for efficiency in digging rock. According to the firm, the "PolerBore" gives unusual efficiency in digging rock because of its strong penetrator points and two flights with strategically placed teeth for graduated cutting action to drill, bulldoze or break up. The auger comes in sizes of 10 to 36 in diameter. It also features a "tru-fitting" multi-size chuck for close tight fits on the driving bar, eliminating shims, waggles or damage to the driving bar.

WHEELBASE—Euclid Div. of General Motors Corp., Cleveland 17, has announced the addition of a new variable wheelbase machine to its line of off-highway rear-dump haulers. Designated the Model S-18, this new machine consists of an overhung engine-type tractor with an Easton-built semi-trailer. It is powered by a GM-110 engine of 336 hp and has an Allison 4-speed Torqmatic drive with converter lock-up. Top travel speed with full payload is 25 mph.

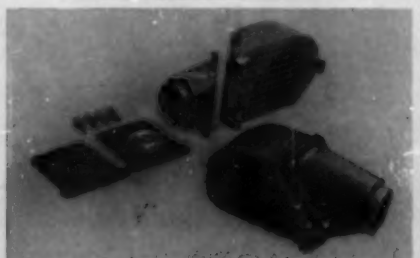
HYDRAULIC PRESS—For installing or removing equalizing-beam center and end bushings on Hendrickson tandems, a new hydraulic press manufactured by Owatonna Tool Co., Owatonna, Minn., is available. The press has a press frame mounted on casters to roll easily on the floor, seven special adapters for removing-installing applications and a 30-ton capacity OTC Power-Twin "center hole" hydraulic ram and pump assembly. The firm declares that hours of time can be saved with this new press and that it is safe and easy to handle.

CAST ALUMINUM

Guyan®

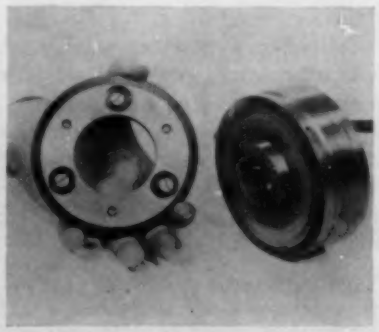
STRAINERS

ECONOMICAL and LONG LASTING



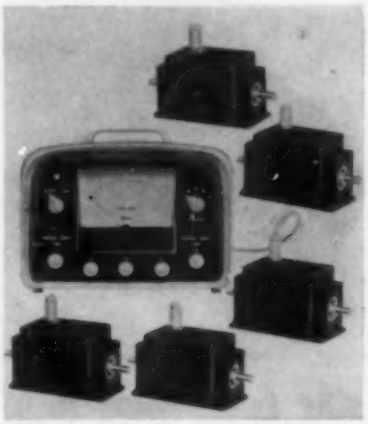
TWO and THREE INCH SIZES
Write for literature

Manufactured by GUYAN MACHINERY CO. LOGAN, W. VA.



FACE-TOOTH CLUTCHES—A new series of face-tooth-type clutches has

been added to the line of stationary-field electromagnetic clutches produced by I-T-E Circuit Breaker Co., Philadelphia, Pa. Available in five ratings from 30 through 725 lb-ft of torque, the new units provide the highest torque in the smallest space of any commercially available stationary field clutches for such applications as positioning drives, reports the firm. The clutches, which are said to virtually eliminate the need for maintenance in machine transmissions, can be buried in a drivebox or transmission and forgotten because there are no air gap adjustments to be made, no slip rings and brushes to be cleaned, adjusted or replaced.



TORQUEMETER – Up to five torque pickup heads are used with the newest torquemeter available from Metron Instrument Co., Denver 3, Colo. For measuring torques of rotating shafts, the meters come with ranges covering torques as low as 0.1 ounce-inch and as high as 500 ounce-inches with accuracy to within plus or minus 2% of full scale. Readings are independent of shaft speeds between 50 rpm (minimum) and 24,000 rpm (maximum). A simple one knob calibration adjustment for each torque pickup head provides stability against ambient changes.

TRACTOR—A new DW15 tractor, Series F, with some design improvements in the power train and front suspension, has been announced by Caterpillar Tractor Co., Peoria, Ill. There is a 30% increase in tooth beam strength gained by developing coarser pitch bevel gears and pinion, declares the firm. Also, a gain of 50% in service life is achieved for the front wheel spindles which have been improved by cold rolling after machining. A 200-hp tractor, the DW15 is mated with the 13-cu yd struck capacity No. 428 Lowbowl scraper.

PLASTIC PIPE—A. M. Byers Co., Pittsburgh, Pa., is now supplying polyvinyl chloride plastic pipe in 8-, 10- and 12-in diameter sizes. There are two types: type

READY!
AIM!
SELL!
WITH
BEE-ZEE
SCREENS

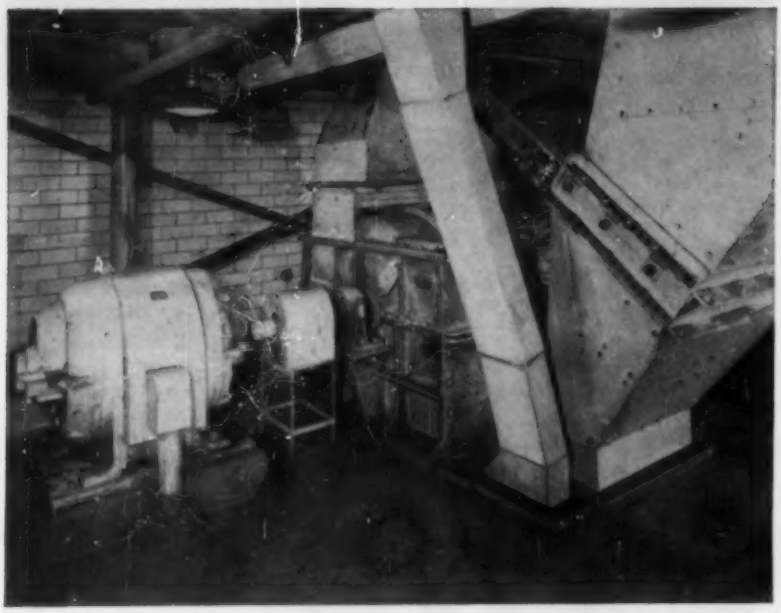
Often a miner's only weapon against production delay or product inferiority is a Bee-Zee Screen. At mine after mine these welded, stainless steel screens improve and speed separation... resist clogging and abrasion...increase dewatering or deliquefying. At mine after mine Bee-Zee Screens are *the difference between problems and profit.*

Get your most marketable product now...faster ...at less cost. Ask your screening equipment manufacturer how Bee-Zee Screens can make you money.

Or, write, wire or phone DIckens 2-5154.

BIXBY-ZIMMER
ENGINEERING COMPANY
1129 Abingdon Street, Galesburg, Illinois

CRUSHING FACTS



American "Rolling Ring" Coal Crusher

splits coal . . . smashes maintenance costs!

In almost five years, the above American Coal Crusher has reduced 1,800,000 tons of 2" x 0" coal to a ¾" x 0" product for a prominent midwestern utility. Since installation, this unit has handled an average annual tonnage of 450,000, with a very low ratio of replacement parts to tonnage. The operating engineer for this utility says, "We have experienced no stoppages . . . crusher operation and maintenance have been very satisfactory."

"Rolling Ring" design makes the difference. Specially designed rotor, consisting of four rows of patented shredder rings, each suspended on a single shaft, rotate freely at a relatively *slow speed*. Coal is *split* rather than smashed. This splitting action saves both power and maintenance, gives more uniform sizing, fewer fines. Rings can be reversed to give extended life.

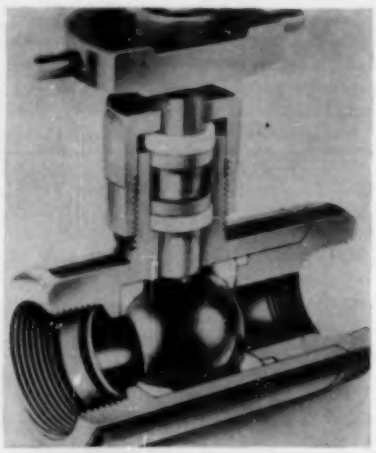
American has manufactured reduction equipment since 1908 and you can be sure that "When you figure costs, the best results come from American *Rolling Ring* Crushers." If you have a coal preparation problem, why not write today for recommendations and literature. Our highly-trained engineering staff will give you prompt assistance.

American PULVERIZER COMPANY

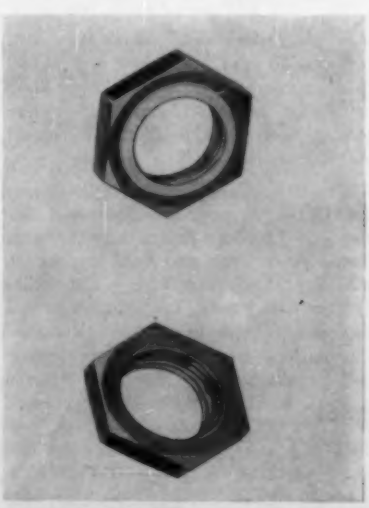
1119 MACKLIND AVE. ST. LOUIS 10, MO.

Equipment News (*Continued*)

1 is a pure PVC with excellent corrosion resistance and working properties suited for severely corrosive process services; type 2 is a similar product containing a modifier to give it high impact resistance in mechanically punishing as well as corrosive applications.



VINYL VALVES – Successful use of rigid vinyl ball valves in piping systems where corrosion is a problem has been announced by Jamesbury Corp., Worcester, Mass. Except for the seats and seals, the valve is made of Geon, a vinyl material from B. F. Goodrich Chemical Co. Available with threaded ends, weld ends or flanges, the vinyl valves are self-compensating for pressure changes, require no lubrication and are said to offer superior resistance to oils, acids, alkalies and most chemicals.



PREVENT LEAKS – Pipe users can eliminate threaded joint leaks by installing the Weatherhead Tef-Seal nut together with the usual fittings on all pipe connections, reports The Weatherhead Co., Fort Wayne, Ind. The manu-

facturer claims that the nuts eliminate leaks on all pipe threads, dry seal or standard. They also serve as a substitute for straight thread "O" ring boss fittings using original female pipe ports, and give positive seal on directional fittings such as tees and elbows without distorting mounting bosses or damaging expensive valves and pumps.

RESCUE KIT—H. K. Porter, Inc., Somerville 43, Mass., is introducing the new RK-1 hydraulic rescue kit. This lighter, unusually portable model, with a powerful 4-ton hydraulic jack, will take care of many rescue jobs with speed and certainty, according to the manufacturer. Features of the kit, which reportedly can get into tough, narrow spots quickly, include: an all-position ram that pinpoints power even when upside down; a Chain-Pull kit; and Bite-Tite clamps that grip tightest when the pull is strongest.

DIESEL TRUCK—A new 55-ton payload diesel electric truck for open-pit mining and other large-scale operations has been announced by Unit Rig & Equipment Co., Tulsa, Okla. Officials of the firm say the truck has been designed to cut haulage costs 10 to 30%. The off-highway vehicle will incorporate the General Electric motorized wheel drive. Electric power for the wheels is supplied from a generator driven by a Cummins VT-12 engine, adds the manufacturer.

Equipment Shorts

Synthetic Oil—A special synthetic oil said to have properties suited for hydraulic-type operations has been announced by Lehigh Chemical Co., Chestertown, Md. Anderol L-386 is a medium viscosity synthetic diester with an operating temperature range of —65 F to 350 F. It has an excellent viscosity-temperature relationship with a viscosity index of 206, notes the firm. The evaporation rate of 5.1 means a nondrying lubricant that will last up to 100 times longer than ordinary petroleum products, according to the firm. In addition the oil provides built-in rust protection and anti-foam.

Hard Hats—The Apex line of safety hats by Boyer-Cambell Co., Div. of White Sewing Machine Corp., Detroit 2, Mich., now have a highly-glossed finish. The gloss is molded in rather than added by means of a polish and is said to be impervious to scratches, bumps and weather exposure. Besides providing a more attractive appearance, the gloss provides heat visibility at a greater distance because of increased light reflection.

(*Continued on p 170*)

SAVE UP TO 60% IN PIPING COSTS!

Now there's no need to buy overweight pipe. Thanks to Victaulic engineering, you can select lightweight pipe "job-rated" to your conditions and install it the *new VIC-EASY* way. You'll cut costs of pipe, transportation, and handling —you'll save from 30% to 60% in man-hour installation.

1. LIGHTWEIGHT PIPE in thicknesses from .065" handles high pressures. Leading mills make sizes 1¼" to 12", steel or aluminum, with *VIC-EASY roll-grooved ends.*

2. VIC-EASY PORTABLE GROOVER rolls grooves into pipe in seconds. Manually or power-operated, this groover removes no metal...retains full wall thickness.

3. VICTAULIC SNAP-JOINT COUPLING assembles and locks by hand—no wrenches or tools required. Other bolted styles of Victaulic Couplings alternately usable.

4. VICTAULIC FULL-FLOW FITTINGS team up with our couplings and lightweight pipe to provide a *complete VIC-EASY system*...cuts costs of installation *and* operation.

For complete information write for Bulletin AA-12.

VICTAULIC COMPANY OF AMERICA
P.O. BOX 509 • Elizabeth, N. J.

Guyan®
HEATERS

FOR CONFINED AREAS

ALSO AVAILABLE IN FLOOR TYPE

WALL TYPE

RUGGED
and ECONOMICAL TOO!

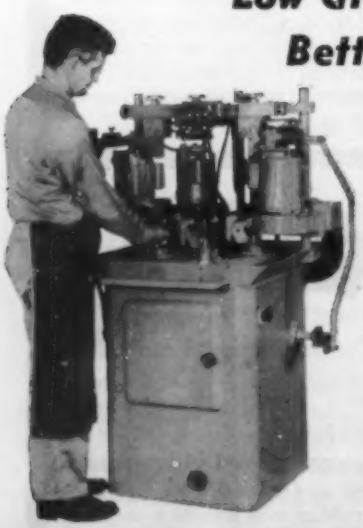
WHEN the space is hard to heat — such as a crane or locomotive cab, a pump house or small office — a GUYAN natural convection heater is the answer. It is a DEPENDABLE, LONG-LIFE HEATER consisting of corrosion-resistant aluminum chromium wire — wound on ceramic forms — and mounted within expanded steel housings.

GUYAN Heater Units are ruggedly built to stand the hard service that is customary in tough industrial applications. Available from 1,500 thru 7,500 watts for 110, 220, 440 volts DC or AC. Priced right — more economically than you might think — and lower than you can make your own. Write for complete information.

GUYAN MACHINERY CO.
LOGAN, WEST VIRGINIA

Guyan®
HEATERS

Low Grinding Costs
Better Performance
Fast Production
Uniform Results
Maximum Bit Life



These are a few of the many advantages you get when you grind your bits automatically on the FAIRVIEW BIT GRINDER.

All of these advantages boil down to savings of both labor and wheels, productivity of 250 to 350 per hour, correct angles—smooth finish, more regrinds, more grinds per bit, more tons per grind and elimination of hazardous operation. It's to your advantage to use the FAIRVIEW BIT GRINDER both in the satisfactory grinding results obtained and in the protection of your investment in expensive equipment.

WRITE TODAY
for fully descriptive bulletin!

FAIRVIEW BIT COMPANY
FAIRVIEW, WEST VIRGINIA

Equipment News *(Continued)*

Liquid Flux—A general purpose liquid flux developed by All-State Welding Alloys Co., Inc., White Plains, N. Y., is now available for use with all soft solders. Called "Duzall," the flux is said to make precleaning unnecessary. It removes surface oxides and vastly expands the capillary action of all soft solders even on deep joints and tough-to-solder applications, adds the firm.

Warning Flags — Industrial Products Co., Philadelphia 33, has a new warning flag. Diagonal reinforcing stays, as well as the fabric itself, are completely nonconductive and non-magnetic, making these flags ideal for specialized electric utility and municipal applications, according to the company. They are particularly suited for marking off danger areas in power plants, substations or wherever high voltages present a potential hazard.

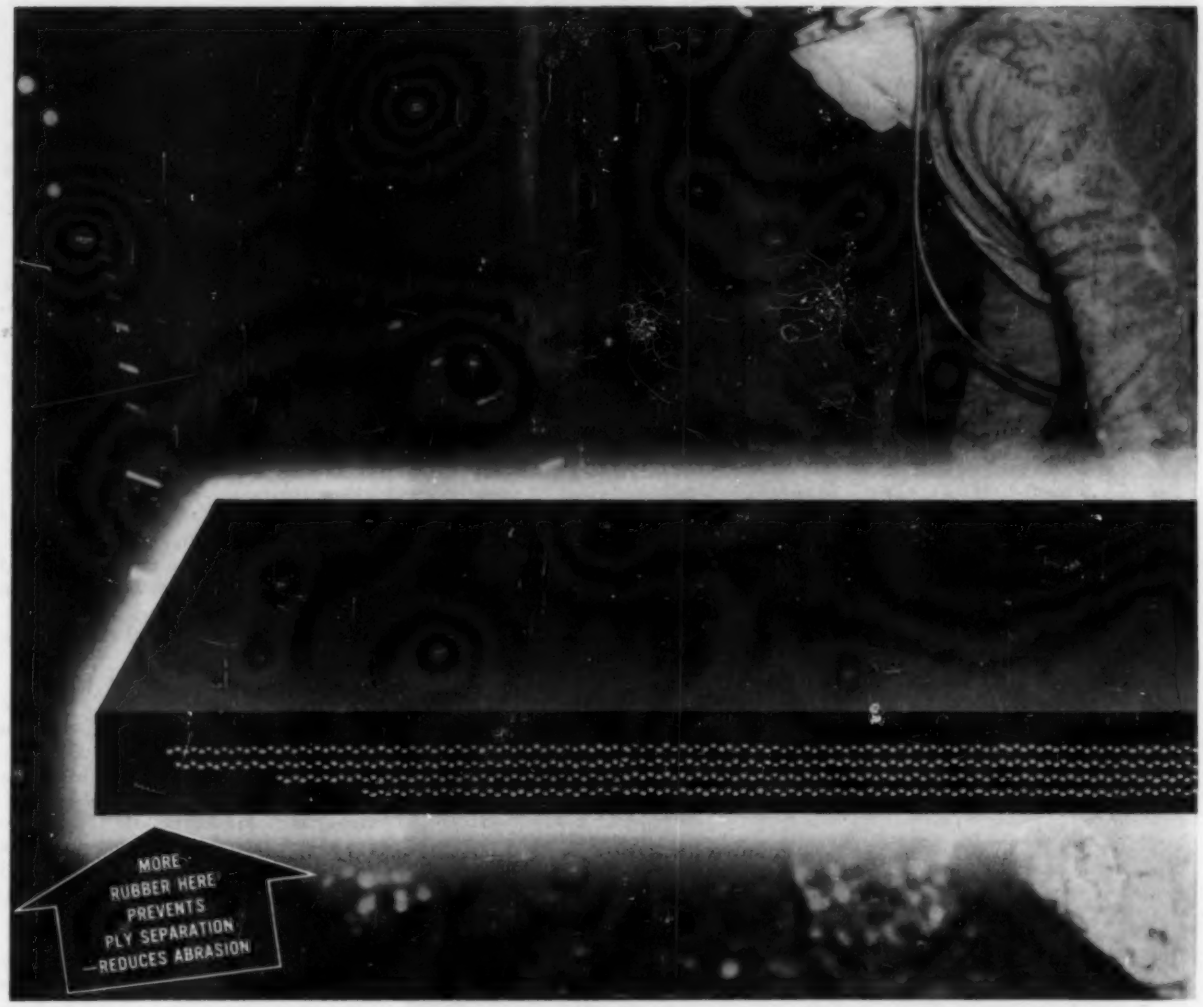
Flip-Top—A new crush-proof flip-top box for individually wrapped items in the MSA first aid kit is a product of Mine Safety Appliances Co., Pittsburgh 19. The new container features stronger construction and easy accessibility to a variety of items, including adhesive bandages and antiseptic swabs.

Hardfacing — Tungsten carbide hard facing is multiplying the life of bug duster augers on coal cutting machines more than six times in the Delmont No. 10 mine of the Delmont Fuel Co. in Hunkers, Pa., according to Kennametal, Inc., Latrobe, Pa. The auger was hard faced with a tungsten carbide material made by Kennametal, resulting in greater durability and wearing qualities. Very little wear was apparent on the Kenface at the end of 32 weeks in contrast to bits which formerly showed extensive wear after five weeks, reports Kennametal.

Free Bulletins

Coal Handling—Link-Belt Co., Chicago 1, Ill., has reprinted its illustrated 16-p booklet, "Methods of Handling Coal at Today's Power Plants," by Frank W. Lovett. Handling methods at steam generating plants, including barge and railroad car unloading facilities, are described.

Jet Cleaners—A 4-p bulletin offered by Sellers Injector Corp., Philadelphia, Pa., presents a round up of the firm's modern plant and tank cleaning equipment. The booklet discusses machinery for heavy-duty cleaning of equipment as well as brief descriptions of two other products, steam injectors for steam boilers and manual-operated positive shut-



EXCLUSIVE "COLEDGE"* CONSTRUCTION

gives Quaker Thermoid Conveyor Belting extra life where it counts

Unique "Coledge" construction puts more rubber *at the edges* where it's needed, prevents ply separation, makes a more flexible and wear resistant edge where abrasion is greatest. Punishment at the edges—especially the tough use dealt out in mining—can kill most conveyor belting in a fraction of the lifetime of Thermoid-Quaker belting.

Tests show Thermoid-Quaker "Coledge" construction lasts and lasts on the same jobs where other belting fails. "Coledge" construction is available on all grades of Thermoid-Quaker belting.

What's more, all Thermoid-Quaker conveyor belting is prestressed in manufacture, so that the belt is actually in compression when you get it—ready for the heaviest load without strain.

Examine Thermoid-Quaker Belting with the exclusive "Coledge" construction at your Thermoid distributor's, or write for further information to Thermoid Division, H. K. Porter Company, Inc., Tacony & Comly Streets, Philadelphia 24, Pa.

*Patent Applied For

THERMOID DIVISION PORTER H.K. PORTER COMPANY, INC.

PORTER SERVES INDUSTRY: with Rubber and Friction Products—THERMOID DIVISION; Electrical Equipment—DELTA-STAR ELECTRIC DIVISION, NATIONAL ELECTRIC DIVISION, PEERLESS ELECTRIC DIVISION; Specialty Alloys—RIVERSIDE-ALLOY METAL DIVISION; Refractories—REFRACTORIES DIVISION; Electric Furnace Steel—CONNORS STEEL DIVISION, VULCAN-KIDD STEEL DIVISION; Fabricated Products—DISSTON DIVISION, FORGE AND FITTINGS DIVISION, LESCHEN WIRE ROPE DIVISION, MOULDINGS DIVISION, H. K. PORTER COMPANY de MEXICO, S.A.; and in Canada, Refractories, "Disston" Tools, "Federal" Wires and Cables, "Nepcoduct" Systems—H. K. PORTER COMPANY (CANADA) LTD.

- Steel Construction
- Mica Insulation
- Corrosion Resistant
- Vibration Proof
- Moisture Resistant
- Provision for Expansion
- Adequate Ventilation
- Rugged Terminals

By use of those durable raw materials . . . steel and mica, and the P-G exclusive features of design, these steel grid resistors have the "built-in quality" to overcome factors which often cause resistor failures. Vibration, moisture laden or corrosive atmospheres have little effect on continuity of service. Try Post-Glover Resistors for heavy duty applications where resistors are subject to severe service . . . continuous "Trouble-Free" performance is assured.

P-G

The Nonbreakable Steel Grid Resistor

THE POST-GLOVER ELECTRIC COMPANY
OFFICE and FACTORY—Kenton Lands Road, Erlanger, Kentucky
MAILING ADDRESS—Box 709, Covington, Kentucky

Equipment News (*Continued*)

off valves for various corrosive liquids.

Conveyor—Jeffrey Mfg. Co., Columbus 16, Ohio, offers a 56-p book on spiral conveyors with engineering data, conveyor layouts, capacity tables, conveyor selection and horsepower requirements. Sections on couplings and shaftings, hangers, trough ends, unit drives, thrust bearings and accessories round out the comprehensive information presented. The company also has available booklets on Jeffrey weighing, batching and proportioning systems and on the entire line of equipment for the process industries.

Crusher—Mechanical features of the 36-in Hydrocone crusher are described in a new bulletin, No. 17B9296, released by Allis-Chalmers Mfg. Co., Milwaukee 1. The crusher is only 4 ft-10 in high and is available with instantaneous hydraulic adjustment for wear and product size. Included is a table with approximate capacities.

Weigher—A pneumatically-operated belt (stream) weigher for continuous weighing of dry materials at low to medium rates is the subject of a new bulletin by Omega Div. of B-I-F Industries, Inc., Providence, R. I. The machine is said to have a wide range of 10:1 with constant speed drive and 50:1 with variable-speed belt drive and a capacity up to 3,000 lb.

Motor Controls—A new digest with descriptive, pricing, technical and engineering information on its complete line of motor controls has been prepared by Allis-Chalmers Mfg. Co., Milwaukee 1. A quick reference selector guide at the front of the booklet makes it easy to find any starter.

Parts—A 4-p brochure illustrating the Tisco line of bulldozer sprocket rims, tractor pads, end bits and blades is now offered by the Taylor-Wharton Co., Div. of Harsco Corp., High Bridge, N. J. The booklet also describes procedures for rapid installation of Tisco sprocket rims.

Tractor—The new International TD-9 is featured in a 16-p 2-color catalog released by International Harvester Co., Chicago 1, Ill. Features of the unit include 55.7 drawbar horsepower, a 5-roller track frame (with 4 rollers optional) and a 6-cylinder turbocharged 66-net hp diesel engine.

Mining—How to improve the efficiency of coal mine operations is the subject of a new booklet called "Cutting Cost in Coal Mining," by Caterpillar Tractor Co., Peoria, Ill. The 8-p booklet describes the use of crawler tractors

with rippers and dozers, wheel-tractor-scraper units, Traxcavators, wagons and motor graders.

Tool Line – A revised catalog from Brunner & Lay, Inc., Franklin Park, Ill., contains illustrations and specifications of every tool in its line, including carbide Rok-Bits, drill rods, striking bars, extension steel and demolition tools.

Replacement Parts – Penn Machine Co., Johnstown, Pa., announces a publication describing their facilities for producing accurate replacement parts for the mining, metalworking and general industry.

Rescue Data – Complete details on MSA Porto-Power hydraulic rescue equipment are provided in Bulletin 0911-1 from Mine Safety Appliances Co., Pittsburgh 19, Pa. A wide variety of applications are illustrated, including removal of piled debris, bracing of tunnel walls, opening smashed vehicle doors and spreading jammed openings.

Pendent Switch – The Joy Pendent "Safe" switch is now available in a 6-station as well as a 4-station model, according to new literature released by the Electrical Products Div., St. Louis 10, Mo. Features of the switches are illustrated along with descriptions of other related Joy switches.

Gearmotors–A new 32-p bulletin on gearmotors has been issued by the Jones Machinery Div. of Hewitt-Robins, Inc., Stamford, Conn. The booklet has technical information on horizontal and vertical mounted gearmotors with capacity up to 125 hp and a variety of output speeds ranging from 780 to ¾ rpm.

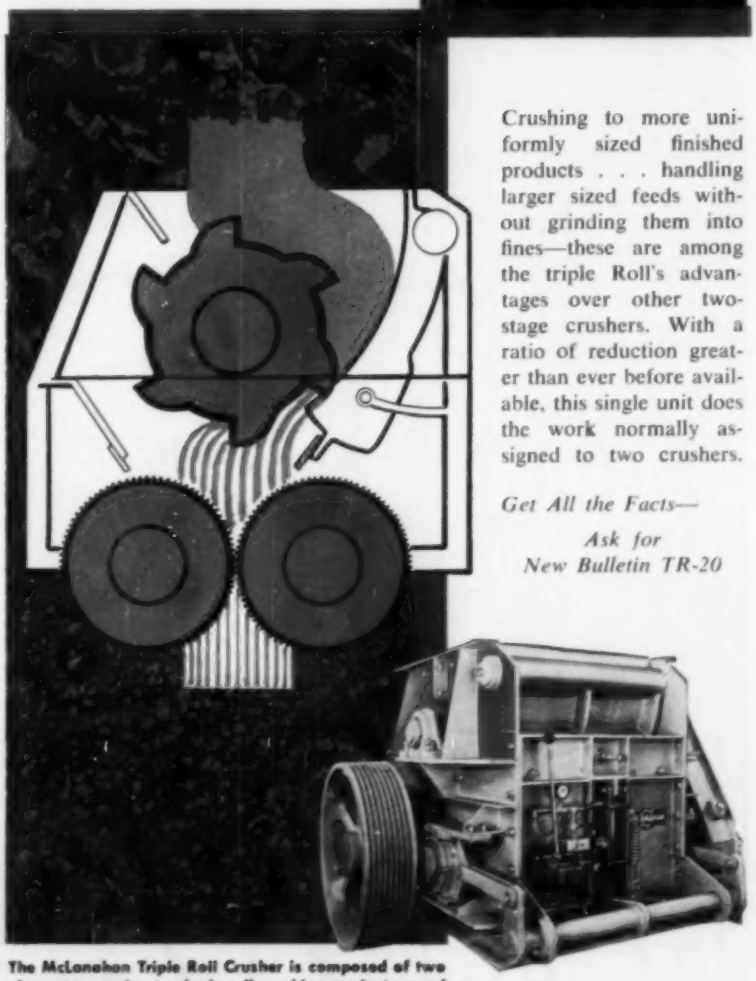
Preparation–Dorr-Oliver, Inc., Stamford, Conn., has an 8-p bulletin describing its equipment for coal preparation plants. Explained are the design, advantages, sizes and capacities of D-O units for virtually every unit operation in the modern plant flowsheet.

TorKar–National Mine Service Co., Indiana, Pa., has available a detailed brochure on the TorKar shuttle car. The bulletin presents full technical information on all main components while specification pages provide data on each of a series of types.

Drills–An 8-p bulletin from the Salem Tool Co., Salem, Ohio, describes the firm's Models 1400 and 1500 coal recovery drills. These units, capable of handling augers from 24 to 42 in, are recovering as much as 200 tons of coal per man-shift, says the firm. They are the only recovery drills of their kind capable of self-movement from hole to hole, it is declared.

CRUSH RUN-OF-MINE TO FINE SIZES

IN THIS TWO STAGE UNIT



Crushing to more uniformly sized finished products . . . handling larger sized feeds without grinding them into fines—these are among the triple Roll's advantages over other two-stage crushers. With a ratio of reduction greater than ever before available, this single unit does the work normally assigned to two crushers.

Get All the Facts—
Ask for
New Bulletin TR-20

The McLanahan Triple Roll Crusher is composed of two elements—a primary single roll crushing against curved crushing plate; and double roll secondary performing the final reduction.

McLANAHAN SINCE 1835

TRIPLE-ROLL CRUSHER

Among the Manufacturers

MRS. CARRIE SENSENICH, one of the oldest active women industrialists in the nation, recently celebrated her 87th birthday and her 60th year on the board of directors of the Irwin-Sensenich Corp., Irwin, Pa. Shown with her as she cut a birthday cake during a party at the plant are C. G. Sensenich (left), president of the firm, and one of five sons who are company executives. Behind Mrs. Sensenich is Alvin G. Keller, chairman of the board. The company is a major producer of heavy industrial material-handling equipment, and during its 60 yr of activity has produced more than 200,000 mine cars for the coal industry.

HE MIGHT NOT KNOW IT —
BUT THAT JOY CUTTER SURE KNOWS-
THAT ISN'T A GENUINE JOY PART!
WHAT'S MORE—
THE COSTS WILL SHOW IT!
GENUINE JOY PARTS AVAILABLE AT 11 LOCATIONS
Birmingham, Alabama • Carlsbad, New Mexico • Centralia, Illinois • Denver, Colorado
Fairmont, West Virginia • Luzerne, Pennsylvania • Madisonville, Kentucky • Meadow-lands, Pennsylvania • Norton, Virginia • Pineville, W. Virginia • St. Louis, Missouri
JOY MANUFACTURING COMPANY
BRANHAM

With the acquisition of Western Precipitation Corp. by Joy Mfg. Co. completed, Joy has elected Walter A. Schmidt, formerly chairman of Western, a director of Joy.

A. W. Knight, president of Western, has been named a vice president of Joy. **A. B. Reamer, N. M. McGrane** and **R. F. Stewart,** are vice presidents of Western which will operate as a Joy division. The Electrical Products Div. of Joy has added three new sales engineers: **Raymond Kroner** – Chicago; **Robert Favez** – St. Louis; and **Thomas Hansen**–Compton, Cal.

Allis-Chalmers Mfg. Co. has made a number of new appointments.

J. M. Duncan was named manager, Industries Group Sales, Washington office, and **B. G. Camp** was named manager, Atlanta district. **James A. Scoggin** takes over the new position of general service manager, Construction Machinery Div., and in A-C's Deerfield Products Construction Machinery Div., **J. T. Skinner** has been named sales manager and **F. C. Schessler** assistant sales manager. In the Processing Machinery Dept., **A. I. Edwards** has been assigned as a special representative. Sales representatives named to the Deerfield Products Construction Machinery Div. are: (western region) **J. M. McKellar**–Denver; and **W. H. Sihler**–St. Louis; (eastern region) **J. A. Apking**–Memphis; **R. G. Plagenz**–Columbus; **T. K. Sloot**–Atlanta; **R. K. Thomas**–Richmond; and **W. G. Zorger**–Harrisburg.

International Harvester Co. has expanded its domestic construction equipment sales operation and has reassigned four regional sales managers in new territories.

J. D. Gladden and **P. D. Evans** will handle the Southwest and Northwest regions, respectively. **H. E. Broadwell**

will handle the Northeast and **W. L. Boughton** will direct sales activities in the Southeast, including West Virginia and Virginia. **R. A. Elliott** and **Jack Bess** continue as regional sales managers of the central and western regions, respectively.

Atlas Powder Co. appointed Stephen M. Wilson Jr., to the new post of field sales manager, Explosive Sales Dept.

J. W. Cochran was appointed manager of the Sales Dept., Chicago district, for the Atlas firm.

D. E. Winters, district manager in the Chicago office of Ohio Brass Co., has been appointed assistant to the general sales manager.

A. W. Beatty Jr., will succeed Mr. Winters as Chicago district manager.

Robert R. Coxey has been named sales engineer for the southeastern states by Cross Perforated Metals, National-Standard Co.

Lee-Norse Co., manufacturers of mechanized mining equipment, has opened a new sales office and warehouse in Arvada, Colo.

The firm will carry a complete stock of replacement parts for its miners, portal buses, jitneys and scooters.

R. W. Adams and D. C. Tibbals have been named sales representatives for the explosives and mining chemicals departments, American Cyanamid Co.

For the Boston Woven Hose & Rubber Div. of American Biltrite Rubber Co., H. A. Bourne has been appointed vice president in charge of manufacturing and R. H. Jackson has been chosen vice president in charge of sales.

Eugene T. Daum has been named sales engineer in the St. Louis office of Nordberg Mfg. Co.

W. L. Hoffe has been appointed manager of the Service-Sales Dept. of Heyl & Patterson, Inc., replacing the retiring Thomas F. Baker.

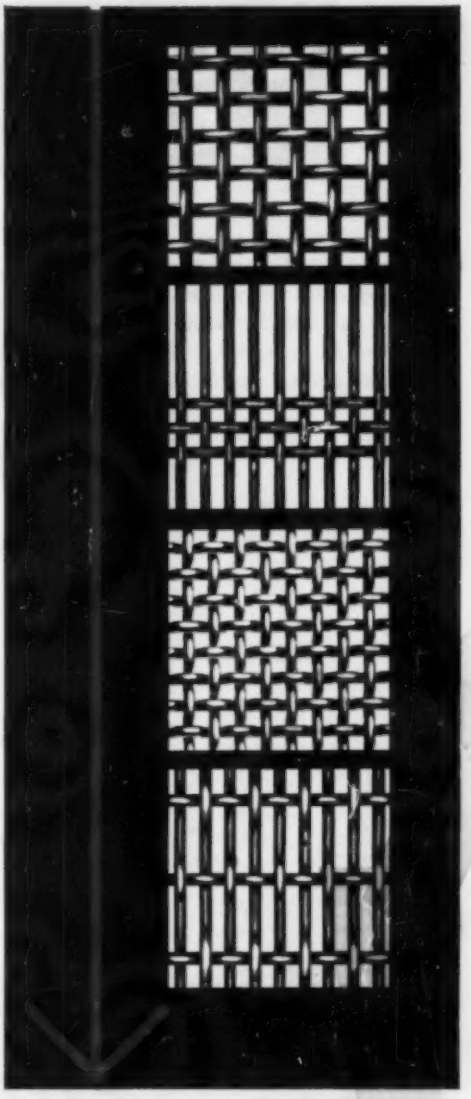
Mr. Baker has been associated with H&P for 60 yr.

Russell L. Lepley has been named vice president and general manager of the Connellsville Mfg. & Mine Supply Co.

Frank Prox Co., Inc., has appointed the Marshall Equipment Co., Inc., Huntington, W. Va., sales representative in the West Virginia, eastern Kentucky, Tennessee and Virginia areas.

Richard B. Steinmetz has been elected president of Anaconda Wire & Cable Co., replacing William E. Sprackling who is retiring.

Lower Cost Screening



Whatever the job—whether the problem is corrosion, abrasion, vibration, heat, pressure—actual on-the-job tests will prove what thousands of customers have discovered: L-S Wire Cloth & Screen last longer, retain original dimension stability better, produce higher quality products of consistent uniformity. Order L-S Cloth & Screen by name—get the industry's finest. Prices are sharply competitive. *Write for Condensed Screen Reference Catalog.*

LUDLOW-SAYLOR

SPACE SCREENS

Woven from any steel or any other metal that can be drawn into wire

IMMEDIATE SHIPMENT-Most weaves & sizes

LUDLOW-SAYLOR WIRE CLOTH CO.
609 S. Newstead Ave. • St. Louis 10, Mo.

LOS ANGELES Star Wire Screen & Iron Works, Inc. (L-S Subsidiary) 2515 San Fernando Rd
BIRMINGHAM 1727 Sixth Ave. North
CHICAGO 6716 West Grand Ave.
PITTSBURGH Union Trust Bldg.
HOUSTON 5638 Harvey Wilson Dr.

FOUNDED 1856

COAL AGE

Index to Volume 64

January to December 1959

The articles and references compiled in this index have been listed alphabetically. A subject related to a major topic has been listed under the major topic. For example, an article dealing with a new mining machine and its operation will be found under the topic, "Mechanization." An article on shuttle cars will be found under "Transportation." Unclassified articles, or those that cannot be placed in any major category, have been listed within the index alphabetically. Editorials, marked (E), will be found under the subject with which they are concerned. Many titles are abbreviated to give prominence to important words.

GENERAL INDEX

(E)-*Editorial;* (CC)-*Coal Commentator;* (N)-*News;* (OI)-*Operating Ideas*

A

Accidents
Disaster at McDowell County mine, W. Va., caused by explosive charge which ignited methane gas (N)....Feb 58
Oglebay Norton Co.'s Burton mine accident attributed to ignition of explosive gas by an electric arc or spark (N) Feb 58
Pa. mine flood (N) Mar 28, Sept 26, Oct 66
U. S. fatalities in 1958 and 1957 (table)....Feb 87
The will to survive....Feb 136
Accidents see also **Safety**
Agreements, Union see **Labor, United Mine Workers**
Alabama Mining Institute
Completes half century of service (CC)....Feb 11
American Institute of Electrical Engineers
Meeting....Mar 60
Mining Section discusses electric services for coal...Nov 130
American Institute of Mining Engineers
Central Appalachian Section and W. Va. CMI joint meeting....June 148
White Sulphur meeting...Dec 146
American Institute of Mining & Metallurgical Engineers
"Engineers for Tomorrow," youth education program established by western Pa. Women's Auxiliary (N) Nov 26
American Mining Congress
Coal Show....June 120
Coal Show exhibits....Apr 139
Coal Show new products preview....Apr 148
Anthracite
Anthracite takes lead in making chemicals directly from coal....July 98
Korea saves $20 million with switch to anthracite (N) July 50
Not over optimism (CC) Sept 11
Recovery spurs coal gains in '59....Feb 74
Water control set for anthracite (N)....Sept 30
Anthracite see also **Regulation, Utilization**
Argentina
French mining engineers will help Argentina raise coal production (N)....Jan 42
Atomic Energy
Isotopes too (CC)....June 11
Nuclear oil (CC)....Apr 11
Nuclear reactor produces low-pressure steam—more contenders? (CC)....May 11
Nuclear steam (N)....May 28
Philadelphia Electric Co. and High Temperature Development Association, Inc., plan nuclear plant (N)....Jan 28
Reactors approach competitive range as power source (N) Dec 26
Auger Mining
High quality strip and auger coal meets today's market requirements....Apr 84
Underground augering today (chart)....Nov 76
Australia
Coal Cliff Colliery, largest preparation plant in country goes into operation (N) May 38
Japanese steel mills sign contracts for Australian coal (N)....Mar 36
Large Japanese coal orders and favorable outlook for further orders will be reflected in large mining and loading - equipment purchases in 1959 (N)....Feb 46
Awards
Bituminous Coal Research award goes to Drs. James D. Batchelor and Everett Gorin (N)....June 63
"Coal Age" awarded the National Safety Council's Public Interest Award for 1958 (N)....May 28
Lucien Denoel Prize competition announced (CC)...Aug 11
Distinguished Alumnus award won by David H. Davis (N) July 56
In any walk (CC)....June 11
Maintenance Idea of the Year award presented to Don Lambing by ME - MMA Nov 122
Old T mers award presented to Okley B. Bucklen (N) Aug 56
Pittsburg & Midway Coal Mining Co. workers awarded certificate of commendation by National Safety Council (N)....June 28
Pittsburgh Coal Co. scholarships won by Regis Smith and Vernon Smith (N).Sept 64
Sahara Coal Co. gives 25 scholarships to Southern Illinois University students (N)....Sept 30

B

Bituminous Coal
Ahead for bituminous (E).Oct 73
The 50 biggest bituminous mines in 1958 (tables)..Apr 118
Industry of distinction (E) May 69
Recovery spurs coal gains in '59....Feb 74
Bituminous Coal see also **Regulation, Utilization**
Bituminous Coal Institute
Holds markets (N)....Jan 28
Planning for growth in the industrial and commercial market. W. A. Raleigh, Jr. (table)....Nov 70
Bituminous Coal Research, Inc.
Explores radioisotopes' potential applications to coal production and utilization (N) Sept 66
Blasting see **Stripping**
Bolting see **Roof Support**
Boreholes see **Shafts**
Brattice see **Ventilation**
Bureau of Mines
Approves blasting method (N) July 28
Equipment approvals Jan 60, Feb 62, Mar 56, April 64, May 48, June 40, July 44, Aug 44, Sept 32, Oct 51, Nov 54
Experimental plant to convert coal into heating gas or gasoline under discussion (N)....Feb 62
Hydraulic bituminous mining research started (N)...Nov 30

C

Cages, Cagers see **Hoisting**
Canada
Canadian coal picture stirring interest of American producers (N)....Mar 30
Cars see **Transportation**
Central Pennsylvania Coal Producers' Assn. and Eastern Bituminous Coal Assn. meeting Dec 140
China
Coal research and techniques in Communist China. K. P. Wang (table)....Oct 110
Red China's coal production for 1958 "phenomenal" (N) Feb 44
Coal
Anesthetic developed from coal in Japan (N)....Aug 36
Canadian coal picture stirring interest among American producers (N)....Mar 30
Chemicals from coal—direct manufacture bears reality July 98
Full measure (E)....Apr 77
Gains for progress (E)....Feb 73
Germany faces coal surplus head-on (N)....Feb 42
How the top 15 coal-producing groups ranked in 1958 (table)....Feb 77
"Keystone Modern Coal Story," publication announced (N)....Feb 58
Mine storage of coal—"Coal Age" operating guide (charts & tables) (report)....Dec 105
New outlook for communist coal. F. H. Baer (tables) (N)....Apr 42
Opportunities still (CC)..Mar 11
Prices—fluid after new contracts (N)....Feb 26
Recovery spurs coal gains in '59....Feb 74
Red China's coal production for 1958 "phenomenal" (N) Feb 44
Coal see also **Anthracite, Bituminous**
"Coal Age"
Donald C. McGraw, Jr., to be new publisher of "Coal Age" (N)....June 28
Mining Guidebook and Buying Directory....July 195-453
Operating guide: mine storage of coal (charts & tables) (report)....Dec 105
Coal Exporters Association
14th Anniversary Convention assesses outlook....July 121
Coal Mining Institute of America
72nd annual meeting....Jan 110
Coal Preparation see **Preparation**
Communications
Helicopter saves executives' time, results in better supervision....Oct 87
How to improve communications. N. R. Diller....Sept 74
Lampboard in shop monitors outlying substations (OI) Apr 196
Telephone-like circuits control, monitor substations (chart) (OI)....Oct 140
Competition see **Imports, Natural Gas, Oil**
Continuous Mining
The ABC's of ventilation for continuous miners (report) Feb 96
Already started on remote control....Aug 11
Coal Age Deep-Mining Guidebook....July 212
Continuous-mining planbook July 213
Control guard prevents accidents (OI)....May 124
Full pillaring with the boring-type miner. Hoard & Cressman....Mar 74
Low-cost highwall mining with continuous miner and extensible belt at Powhatan. A. D. Henry....Feb 104
Mining at Loveridge....Dec 78
Remote control for continuous miner boosts safety in pillar extraction. W. G. Kegel (charts)....Aug 98
Contracts, Union see **Labor, United Mine Workers**
Conveyors
Belt with a lid (CC)....Mar 11
Better mounting holds split wheel solidly (OI)....Apr 196
Coal Age Deep-Mining Guidebook....July 222
Continuous miner and extensible belt team up for low-cost highwall mining at Powhatan. A. D. Henry Feb 104
Crossover eases supplying (OI) Jan 118
Hand-loaded conveyors—still a place (CC)....Sept 11
Island Creek Coal Co. orders conveyor system for transport of bituminous coal (N) Apr 28
Mechanical-mining planbook July 226
Switch engine-conveyor provides continuous car loadings (OI)....Mar 116

Three units feed one loading point at Ditney Hill (chart) Sept 100
"Turnover" conveyor belt system used for long-distance hauling (N) Jan 54
Units of conveying equipment sold for use in coal mines, 1957-58, by States (table) Feb 92
Conveyors see also **Transportation**
Cyclones see **Preparation**
A pig is a pig is a pig Dec 152
Czechoslovakia
Output of coal increased 3% during first half of 1959 (N) Oct 54

D

Tips for better locker installations (OI) Dec 156
Drainage
Amphibious pump carrier simplifies strip pit dewatering (OI) Jan 118
Anthracite mine to get water control (N) Sept 30
Coal Age Deep-Mining Guidebook July 258
Dozer converted to pumper (OI) Jan 118
Oil - field chemical controls water inflow (OI) May 124
Pumps—helpful hints on applying centrifugal pumps. F. F. MacWilliams (charts) Nov 100
Driers, Centrifugal, Heat see **Preparation**
Drilling, see **Face Preparation, Shafts, Stripping**
Dust Allaying see **Safety**
Dustproofing see **Preparation**

E

Economics
Big and small (E) Sept 73
Does inflation scare you? Aug 122
North American Coal Co. sells coal docks to C. Reiss Coal Co. (N) June 30
Still one-sixth (CC) Oct 11
Wages—how far . . . how fast (CC) May 11
Electricity
AC cables for coal (charts & tables) F. R. Hugus
Pt 1 Selection, manufacture, testing Nov 104
Pt 2 Installation, use, maintenance Dec 128
Better cable protection with circuit interrupters Nov 91
Better hanger stops cable sagging (OI) May 124
Cable for AC underground . . . choice and installation. T. R. Weichel (tables) May 90
Cable heating (CC) Apr 11
Cable splicing—low-cost Sept 82
Capacitor location for maximum benefits (OI) Sept 122
Central circuit-scanning system monitors and controls outlying units. W. G. Kegel (chart) Oct 102
Coal Age Deep-Mining Guidebook July 261
Connecting single-phase transformers (chart) Dec 125
Design and application of AC mining equipment—AIEE special meeting theme. Mar 60
Designs for efficient, safe AC power systems. D. E. Hamilton June 98
Direct conversion (CC) Mar 11
Fuel cell prospects and coal W. A. Raleigh, Jr. (chart) Dec 74
Glossary of electrical terms Sept 92
How to cut cable cost Apr 90
Insulated connector resists corrosion. E. S. Ralls (OI) July 134
Is the power really off? (chart) Dec 124
Measuring motor temperature Sept 85
Mercury switches—how to apply and service them (charts) Oct 94
Correction Nov 55
More coal-based power—Dave Johnston steam - electric plant increases Wyoming's generating capacity by ½ Oct 74
Motor-starter design fundamentals Dec 123
New standard for returnable reels approved (N) Aug 56
Open-Pit Mining Association, Electrical Division — 15th annual meeting Aug 106
Piggyback generator for truck radio saves gas. D. E. Schuck (OI) Aug 124
Plastic cables for deep mining at Pittsburgh Coal. C. W. Parisi & others Apr 122
Selection and use of electrical instruments Oct 93
Correction Nov, 1959 56
Third overload relay for three phase motor starters? Sept 84
Time clock checks battery charging (OI) June 162
Trailing cables (CC) Jan 11
Wireless control of 38,000-V power Mar 82
Europe
Poland sells coal to west European nations despite their own overproduction (N) Aug 36
European Coal and Steel Community
France will not reduce coal output (N) May 38
Italy stands pat on coal policy (N) May 38
Exports
Coal Exporters Association 14th Anniversary Convention July 121
Coking coal—record shipment headed for Brazil (N) Aug 28
Europe's fuel picture poses increased threat to U. S. coal exports (table) (N) Oct 26
Germany upends 1959 exports (N) Mar 26
Outlook for exports (E) Mar 65
Still good (CC) Feb 11

F

Face Preparation
Blasting method wins approval (N) July 28
Coal Age Deep-Mining Guidebook July 231
High-tonnage punch mining at Chafin Coal Jan 104
Fans see **Ventilation**
Fatalities see **Accidents, Safety**
Filters see **Preparation**
Fires
Pine Township Coal Co. tipple and cleaning plant destroyed by fire (N) Feb 60
First-Aid see **Safety**
Foremen
Cost-control functions of production foremen May 114
The future of man—assessed by 7 outstanding men Nov 138
Giving credit where credit is due Oct 132
How to tell what you know, by Arthur Secord: a Foremen's Forum book review June 158
The importance of training for leadership July 128
Legal responsibilities of mine supervisors Aug 120
Let's find the handles again! Mar 110
Maintenance responsibilities of production foremen Apr 186
Mouth-to-mouth resuscitation Sept 116
So you didn't go to college! Feb 134
10 hints on accepting changes Mar 112
Three steps to greater success. Bernard Haldane Jan 114
The will to survive Feb 136
France
France will not reduce coal output (N) May 38
French mining engineers will help Argentina raise coal production (N) Jan 42
French raise mark (N) Jan 38
Imports of coal, coke and lignite dropped in 1958 (N) Feb 44
Freezeproofing see **Preparation**
Freight Rates
Cut coal rate offered Consolidated Edison of New York (N) Apr 72
Fuel
Oil, gas hope for larger role in steelmaking (N) Sept 26
Wanted . . . a national fuel policy (N) June 26
What diesel fuel to use? (OI) July 132

G

Gas
Gas wins close one—Supreme Court reverses Memphis Gas Case decision (N) Jan 28
Salable methane? (CC) May 11
Gas see also **Natural Gas, Regulation**
Gasification
Britain to stop underground gasification experiments (N) Mar 36
Germany speeds degasification (N) Dec 46
In Great Britain (CC) Jan 11
Lurgi gasification plant scheduled for immediate construction at Coleshill, Warwickshire, England (N) Jan 42
Pipeline gas from char via the Lurgi process — economic outlook. Sidney Katell & others (tables) (charts) Aug 92
Germany
Germany faces coal surplus head-on (N) Feb 42
Speeds degasification (N) Dec 46
Upends 1959 exports (N) Mar 26
Great Britain
British National Union of Mineworkers has agreed to close 36 mines this year (N) Feb 46
Gasification in Great Britain (CC) Jan 11
Imports hurt British coal (N) June 44
Lurgi gasification plant scheduled for immediate construction at Coleshill, Warwickshire (N) Jan 42
Reduces production goals (N) Oct 54
Seeks economical process for producing oil from coal (N) Sept 46
Smut-forming deterrent device proves useful at British Petroleum Co. (N) Aug 36
Stockpiles high; drastic measures needed to restore ailing coal industry to health (N) Jan 38
Underground gasification experiments will stop (N) Mar 36

H

Holland
Netherlands State Mines to purchase coal fields between frontier and West German towns (N) Aug 38
Hungary
Output of coal doubled from 1948 to 1958 (N) Oct 54

I

Illinois Mining Institute
Annual meeting Nov 134
Imports
British coal hurt by oil imports (N) June 44
Eisenhower curbs oil imports (N) Apr 26
France—imports of coal, coke and lignite dropped in 1958 (N) Feb 44
Italy stands pat on coal policy (N) May 38
Natural gas from Canada for the midwest approved by FPC (N) Dec 26
Natural gas into the midwest from Canada—U. S. companies renew applications (map) (N) Aug 26
India
First American-made coal preparation plant to be ready in 1962 (N) Sept 62
Indiana Coal Mining Institute
Mine operations and personnel development are major themes as Indiana deep-miners meet May 62
Industrial Engineering
Cost-control functions of production foremen May 114
Effective cost control July 196
Injuries see **Accidents, Safety**
International Briquetting Association
6th biennial conference discusses briquetting without binder (N) Oct 31
Italy
Italy stands pat on coal policy (N) May 38

J

Japan
Anesthetic developed from coal (N) Aug 36
Markets its first automatic coal mining machine (N) Nov 42
Steel mills sign contracts for Australian coal (N) Mar 36
Joint Solid Fuels Conference
Annual meeting Dec 144

K

Korea
Anthracite comes of age (N) July 50

L

Labor
Anthracite contract talks (N) Jan 50
Coal prices—fluid after new contracts (N) Feb 26
Committee formed to enforce boycott against nonunion produced coal elects Rep. Mollohan (D-W. Va.) as its administrative officer (N) Mar 42
Illinois Mining Board revokes certificates of three supervisory employees of Old Ben No. 9 mine (N) Jan 28
Isom Coal Co. files suit against United Mine Workers of America (N) Sept 66
Miners get pay hike (N) Jan 26
Motivation—a management "must." R. B. Hewes Jan 90
NLRB decides in favor of 15 employees at Peabody Coal Co. (N) Sept 66
Strike shuts mine in Harlan County, Ky. (N) Apr 30
Ultimate end (E) Dec 73
Wages . . . how far . . . how fast (CC) May 11
Welfare Fund—UMWA's annual report (N) Nov 30
The will to survive Feb 136
Wyoming Supreme Court rules state courts have jurisdiction to grant injunction to halt picketing at Carbon County mine (N) July 62
Labor see also **United Mine Workers**
Laws and Legislation
Bill before Pa. legislature would require coal firms to fill abandoned stripping (N) Oct 66
Food & Drug Administration bans use of 17 coal tar colors in lipsticks (N) Nov 62
Knox Coal Co. flood disaster probe indicts 7 for involuntary manslaughter (N) Oct 66
Knox Coal Co. flood disaster probers urge new mine laws (N) Sept 26
Legal responsibilities of mine supervisors Aug 120
New labor law unclear on secondary boycotts (N) Dec 26
Proposal to bring small mines under Federal safety law wins Senate committee's approval (N) Sept 28
Laws and Legislation see also **Regulation**
Lignite
Utilization to be explored by University of North Dakota (N) Sept 64
Loading Machines see **Mechanization**
Locomotives see **Transportation**
Longwall see **Continuous Mining, Conveyors, Mechanization, Mining Methods**
Lubrication
Automatic trolley-wire lubricator saves time (OI) May 122
New facilities cut oil-distribution cost (OI) Apr 194

M

Maintenance
Applying new alloy steel for lower strip maintenance at Hanna Coal. Hyslop & Kleckner Feb 126

Coal Age Index, Vol. 64, January-December, 1959

Automatic trolley-wire lubricator saves time (OI)..May 122
Ball bearings—how to check ball bearings.....Sept 88
Better cable protection with circuit interrupters....Nov 91
Better hanger stops cable sagging (OI).....May 124
Building for better mining at Sullivan Trail Coal Co. June 108
Bus is portable shop and office (OI).....Nov 144
Cable splicing—low-cost..Sept 82
Coal Age Mining Guidebook—Prescription maintenance for production stability July 315
Connecting single-phase transformers (chart).....Dec 125
Diesel engines — preventive maintenance program..Oct 90
Electrical instruments—selection and use.....Oct 93
Correction.....Nov 56
Gasket block extends punch life (OI).....June 162
Hot weather maintenance tips for engine-powered equipment (OI).....June 164
How central-shop facilities and services pay off at Slab Fork Coal.....May 104
How to choose the right tractor shoe (OI).....Sept 120
How to cut cable cost....Apr 90
How to get more life from carbide roof bits (OI)....Oct 138
Hydraulic parts reclaimed Dec 122
Is the power really off (chart) Dec 124
Key item (CC).....Feb 11
Lampboard in shop monitors outlying substations (OI) Apr 196
Maintenance responsibilities of production foremen..Apr 186
Measuring motor temperature Sept 85
Mercury switches—how to apply and service them (charts).....Oct 94
Correction.....Nov 56
Motor-starter design fundamentals.....Dec 123
New facilities cut oil-distribution cost (OI).....Apr 194
Organizing for better maintenance—solving problems of organization, personnel and procedure. Daniel Jackson, Jr. (report).....Aug 72
Pipes—how to handle heavy pipe (OI).....Dec 158
Planned maintenance doubles engine life reduces downtime at Hanna Coal (tables) June 82
Prevention benefits (E)..Nov 69
Preventive maintenance: a positive approach. Daniel Jackson, Jr. (charts)...Nov 84
Proper maintenance increases bearing life (OI).....Feb 134
Safety reminder—never oil oxy-acetylene apparatus (OI).....Sept 120
Shop-made key puller is rugged (OI).....Mar 116
Special chisels cut rivets easier (OI).....June 164
Support prevents clamp-screw damage (OI).....Apr 194
Sure-grip tongs handle stock safely (OI).....Jan 120
Third overload relay for three phase motor starters?..Sept 84
Trailing cables (CC).....Jan 11
Welding and cutting outfits—maintenance rules.....Sept 86

Management
Can your son or daughter get into college?.....Sept 118
How central-shop facilities and services pay off at Slab Fork Coal.....May 104
How much net? (CC).....Jan 11
How to improve communications. N. R. Diller.....Sept 74
How to make better decisions. H. L. Durrett.....July 114
How to modernize coal management. W. A. Raleigh, Jr. June 74
Johnson, Ed. Well done (CC) Oct 11
Keep open to new ideas (CC) Oct 11
Man in motion (CC).....June 11
Men and words (CC).....Aug 11
Motivation — a management "must." R. B. Hewes..Jan 90
Muckies from mickies (CC) Dec 11
Not only the big (E).....Oct 73
Penn State Workshops pioneer in management training for coal.....June 76
Rocky Mountain Coal Mining Institute — 55th annual meeting.....Aug 116
Three steps to greater success. Bernard Haldane.....Jan 114
Ultimate end (E).....Dec 73
Management see also **Foremen**
Mechanization
Already started on remote control (CC).....Aug 11
Auger — new self - moving, underground auger may yield 100 tons per shift (chart).....Nov 76
Automatic X-Ray separator reported near completion in Russia (N).....Jan 42
Badger Coal Co.'s productive system. A. E. Flowers..May 70
Building for better mining at Sullivan Trail Coal Co. June 108
Clinchfield's bid for world's largest mine—Moss No. 3 July 72
Coal Age Deep-Mining Guidebook.....July 222
Combine that carries out all operations in coal drift completes trials in Russia (N) July 51
High-tonnage punch mining at Chafin Coal.....Jan 104
Loading machines — still a place (CC).....Sept 11
Mechanical-loading and mining equipment in use in 1957, by States, compared with sales reported in 1958 (table).....Feb 92
Mechanical-mining planbook July 226
Miniature equipment boosts production in low-coal mines.....Jan 86
Peabody's electronic miner may open new doors to coal (N).....May 26
Pushbutton-controlled retarders for railroad cars at U. S. Steel's Corbin plant Feb 118
Remote control for continuous miner boosts safety in pillar extraction. W. G. Kegel (charts).....Aug 98
Russia—mechanical coal combine for very small excavations (N).....Mar 36
Sales of coal-mine equipment —1958. Young & Anderson (chart & tables).....Feb 90
Special shovel solves tough loading problem (OI)..Nov 142
Switch engine-conveyor provides continuous car loading (OI).....Mar 116
"Truck-mine" designed cutting machine boosts efficiency in low seams..June 90
Underground bituminous and lignite production, by methods of loading, 1956-58 (table).....Feb 90
Youghiogheny & Ohio Coal Co. purchases highly automatic dumping system for its Nelms No. 2 mine (N) Feb 60
Mechanization see also **Continuous Mining, Conveyors, Mining Methods**
Merchandising
Basic for business—participation in sale, installation and servicing of burning equipment (E).....Aug 67
Opportunity for coal: regional selling of coal - burning equipment. Martin Burke, Jr.....Aug 68
Parallel payoff (E).....June 73
Pay dirt (CC).....Aug 11
Planning for growth in the industrial and commercial market. W. A. Raleigh, Jr. (table).....Nov 70
Promotion-first step (CC)..Feb 11
Quality control of raw coal pays off for M & O. W. A. Raleigh, Jr. (chart)....Oct 80
Real target (CC).....July 11
Rx for growth . . . a new sales approach; authorities speak; defining the market (tables) Nov 76
Mine Cars see **Transportation**
Mine Inspectors' Institute of America 49th annual convention.....Aug 110
Mine Rescue see **Safety**
Mining Electro-Mechanical Maintenance Association Annual Meeting.....Nov 122
Mining Methods
Approaches to automation highlight developments in 1958.....Feb 80
Chafin Coal Co. — high-tonnage punch mining..Jan 104
China — coal research and techniques in Communist China. K. P. Wang (table) Oct 110
Clinchfield's bid for world's largest mine—Moss No. 3 July 72
Coal Age Deep-Mining Guidebook — Low-cost development for sustained efficiency.....July 203
Computers too (E).....Jan 69
High quality strip and auger coal meets today's market requirements.....Apr 84
Hydraulic bituminous mining —research started (N)..Nov 30
Light projector and camera speed underground profile measurements (OI).....Oct 140
Making a better loading point Apr 96
Miniature equipment boosts production in low-coal mines Jan 86
New portal . . . higher TPM, better ventilation at Barnes & Tucker's Lancashire No. 15 mine (chart).....Sept 110
New, yet old (CC).....Oct 11
Not impossible—longwall may make significant advance in U. S. (CC).....July 11
Overseas flashes (CC).....Feb 11
Peabody's electronic miner may open new doors to coal (N).....May 26
Soviet progress (N).....Sept 50
Three units feed one loading point at Ditney Hill (chart) Sept 100
"Truck-mine" designed cutting machine boosts efficiency in low seams.....June 90
Mining Methods see also **Continuous Mining, Conveyors, Mechanization**

N

National Coal Association
Better instruments (E) July 71
42ndAnniversary Convention: "NCA Charts New Course"; reorganizes to expedite industry's growth.....July 120
National Coal Policy Conference
Coal group formed (N)..Apr 28
Incorporates (N).....July 28
Wanted . . . a national fuel policy (N).....June 26
National Safety Congress
Coal Mining Section to continue campaign to prevent roof-fall injuries.....Dec 136
Natural Gas
Canada creates National Energy Board (N)....Sept 30
Canadian gas for the midwest approved by FPC (N)..Dec 26
From the North . . . gas companies renew applications to pipe natural gas into midwest from Alberta, Canada (map) (N).....Aug 26
Salable methane? (CC)..May 11
Steelmaking may offer oil and gas larger role as fuels (N) Sept 11
U. S. Court of Appeals overrules FPC, permits gas for Con-Ed (N).....Dec 28
Natural Gas see also **Regulation**

O

Oil
Eisenhower curbs oil imports (N).....Apr 26
Imports curbs favored (N) Mar 28
Imports hurt British coal (N) June 44
Nuclear oil (CC).....Apr 11
Sahara oil—increased threat to U. S. coal exports (N) Oct 26
tSteelmaking may offer oil and gas larger role as fuels (N) Sept 11
Oil see also **Regulation**
Oil Treatment see **Preparation**
Open Pit Mining Association
Electrical Div.—15th annual meeting.....Aug 106
Overburden Preparation see **Stripping**
Overcasts see **Ventilation**

P

Permissible Equipment Approvals see **Bureau of Mines**
Pipelines
Coal by pipeline — 2 firms study piping coal from mines to East coast (N)..Oct 31
Coal pipeline No. 2 considered by Ohio (map) (N)....Dec 28
Natural gas into the midwest from Canada—U. S. companies renew applications (map) (N).....Aug 26
Youngstown Coal Pipe Lines Co. to construct coal pipeline from East Liverpool to Youngstown, Ohio (N)..Jan 54
Poland
Solves problem of hydraulic transportation of coal (N) Nov 42
Western Europe buys Polish coal despite its own overproduction (N).....Aug 36
Preparation
Approaches to automation highlight developments in 1958.....Feb 80
Automatic X-Ray separator reported near completion in Russia.....Jan 42
Avon Coal's strip process highlighted by 40:1 ratio and feldspar jig.....May 110
Badger Coal's modern preparation undergirds productive mining. A. E. Flowers..May 70
Bin-level indicator (OI)..July 134
Bituminous and lignite production, by methods of mining and cleaning, 1956-58 (table).....Feb 90
Bituminous mechanically cleaned in 1957, compared with 1958 sales of equipment (table).....Feb 92
Clinchfield's Moss No. 3—precision washing keyed by automation.....July 80
Coal Age Mining Guidebook—Modern Coal Preparation July 294–314
Coal Cliff Colliery, largest plant in Australia, goes into operation (N).....May 38
Cyclone handles tailings (OI) Feb 140
Designing for low-cost coal preparation. N. L. Davis (tables).....Apr 126
Desliming and heat drying. R. M. Grimm.....Mar 104
Dry cleaning and washing fines at Crichton No. 4 mine Mar 88
Dryer—rotary-kiln dryer provides low-cost drying, increases plant efficiency and product quality (chart) Nov 118
Entrainment dryer cuts 10M moisture economically at Orient 3 (chart) (table) Aug 102
Flexibility, efficiency, economy mark Kocher heavy-media plant (chart).....Oct 114
High quality strip and auger coal meets today's market requirements.....Apr 84
Improving coking coal quality —U. S. Steel's new Wellington, Utah, preparation plant R. M. von Storch.....Feb 112
India contracts for its first American-made coal preparation plant.....Sept 62
New anthracite preparation facilities in 1958 (table)..Feb 85
New bituminous preparation facilities contracted for in 1958 (table).....Feb 82
New fine-coal plant strengthens Omar's market position. Daniel Jackson, Jr.....Apr 102
Peabody Coal's efficient thin-seam stripping serves utility market.....May 80
Preparation at Loveridge..Dec 92
Preparation facilities: Jan 56, Feb 67, Mar 42, April 64, May 48, June 48, July 51, Aug 48, Sept 56, Oct 56, Nov 54
Preserving structure (CC) Sept 11
Pushbotton-controlled retarders for railroad cars at U. S. Steel's Corbin plant...Feb 118

Quality control of raw coal pays off for M & O. W. A. Raleigh, Jr. (chart)....Oct 80
Screen conversion eliminates blinding (OI).....Mar 118
Thermal drying of coal. Young & Anderson (tables)...June 114
Up for storage (CC).....Sept 11
Upgrading fragile coal to premium metallurgical product (charts) (table)....Sept 94
U. S. Steel to build dryer at Wellington, Utah (N)..July 28
Public Relations
Better instruments (E)...July 71
Coal power (CC).....Aug 11
Currency coup (CC).....Nov 11
Giving credit where credit is due.....Oct 132
Real progress (CC).....Mar 11
Pumping see **Drainage, Preparation**

R

Radio see **Communications**
Railroads
Norfolk & Western R.R. and Virginia Ry. Co. merge (N) Nov 30
Out? Not yet (CC).....Dec 11
Refuse Disposal
W. Va. water (CC).....Nov 11
Regulation
Eisenhower curbs oil imports (N).....Apr 26
Louisville, Ky., City-County Air Pollution Control Board will not regulate sulphur content of coal burned by industry (N).....Feb 62
Oil imports curbs favored (N) Mar 28
U. S. Court of Appeals reverses FPC order, permits gas for Con-Ed (N).....Dec 28
Wanted . . . a national fuel policy (N) June 26
Regulation see also **Laws and Legislation**
Research
Bituminous Coal Research award goes to Drs. James D. Batchelor and Everett Gorin (N).....June 63
Bituminous Coal Research lends turbine to Bureau of Mines (N).....May 28
Britain to stop underground gasification experiments (N) Mar 36
China — coal research and techniques in Communist China. K. P. Wang (table) Oct 110
Coal as a binder material for roads to be tested by Curtiss-Wright Corp. for Kentucky State Highway Dept. (N).....Aug 28
Coal research advances reappraised at annual BCR meeting.....June 154
Consolidation Coal Co. and Standard Oil of Ohio agree to begin joint research on methods of making hydrocarbon liquid fuels from coal (N).....Feb 28
Thomas V. Falkie receives renewed fellowship from United States Steel Foundation, Inc. (N).....June 63
Great Britain seeks economical process for producing oil from coal (N).....Sept 46
Hydraulic bituminous mining —research started (N) Nov 30
Island Creek Coal Co. finishes Coal Research Center at Holden, W. Va. (N)...Mar 42
Isotopes too (CC).....June 11
Mining too (E).....Dec 73
Power source project links 10 electric utilities and research lab (N).....Dec 28
Radioisotopes—potential applications to mining to be studied (N).....Sept 66
Smelting studied (N).....Jan 50
Rocky Mountain Coal Mining Institute
55th annual meeting...Aug 116
Roof-bolting see **Roof Support**
Roof Support
Coal Age Deep-Mining Guidebook.....July 235
Drilling from the surface eases gas and roof problems (CC) July 11
Easier, safer roof-bolt recovery with special jacks (OI).....Jan 120
How to get more life from carbide roof bits (OI)..Oct 138
Now's the time—to guarantee absolute minimum in roof-fall injuries and fatalities (E).....Nov 69
Russia
Automatic X-Ray separator reported near completion (N).....Jan 42
Combine that carries out all operations in coal drift completes trials (N).....July 51
Conveyor of new type moves small solid objects like coal, ore or rock (N).....Oct 54
Improvements in mining techniques and coal utilization (N).....Sept 50
Mechanical coal combine for very small excavations (N) Mar 36
New outlook for communist coal. F. H. Baer (tables) (N) Apr 42
New Seven-Year Plan increases output goal by 100 million metric tons (N) .Aug 36

S

Safety
Already started on remote control (CC).....Aug 11
Better dust collection with a packaged unit at Bethlehem Mines. Cressman & White June 92
Cable heating (CC).....Apr 11
Calcium-chloride paste reduces dust hazard (OI) .Mar 118
Car stop has tie catcher (OI) June 164
Coal Age Mining Guidebook—Making mining safer July 337-341, 345
Colmol saves lives of three trapped miners (N).....July 62
Control guard prevents accidents (OI).....May 124
Cover for controls prevents bulldozer tampering (OI) Jan 120
Drilling from the surface eases gas and roof problems (CC) July 11
Dust inspection and control to avoid fire in dry winters Oct 134
Explosion warning device developed in Sweden (N) .Aug 36
First aid skills tested by coal men (N).....Nov 28
Foam injection increases blasting safety (OI).....Dec 156
Handsome payoff — accident prevention (CC).....Apr 11
Helpful suggestions for safer, more efficient welding (OI) Feb 142
Illinois Mining Board revokes certificates of three supervisory employees of Old Ben No. 9 mine (N)...Jan 28
Illinois safety record for 1958 best in history of state (N) Feb 58
Is the power really off (chart) Dec 124
Knox Coal Co. flood disaster probers urge new mine laws (N).....Sept 26
Let's find the handles again! Mar 110
Mine Inspectors' Institute of America—49th annual convention.....Aug 110
Mouth-to-mouth resuscitation Sept 116
National campaign to prevent injuries from roof falls in 1960 announced.....Dec 154
National First-Aid and Mine Rescue Contest (N)...Nov 66
National Safety Congress meeting.....Dec 136
Non-flammable fluids — Another step (CC).....June 11
Now's the time—to guarantee absolute minimum in roof-fall injuries and fatalities (E).....Nov 69
Plastic cables for deep mining at Pittsburgh Coal. C. W. Parisi & others.....Apr 122
Portable rack holds self rescuers, fire extinguishers (OI) Nov 142
Proposal to bring small mines under Federal safety law wins Senate committee's approval (N).....Sept 28
Reminder — never oil oxy-acetylene apparatus (OI) Sept 120
Remote control for continuous miner boosts safety in pillar extraction. W. G. Kegel (charts).....Aug 98
Rocky Mountain Coal Mining Institute — 55th annual meeting.....Aug 116
Safety in 1958.....Feb 86
Safety in the 60's (CC)..Nov 11
U. S. fatalities in 1958 and 1957 (table).....Feb 87
Water control set for anthracite (N).....Sept 30
Welding and cutting outfits—maintenance rules.....Sept 86
W. Va. CMI—AIME joint meeting study safety and haulage, mine development and preparation.....June 148
Western Pennsylvania mines complete safety course (N) Dec 52
Safety see also **Accidents**
Screens, Screening see **Preparation**
Shooting see **Face Preparation, Stripping**
Shuttle Cars see **Transportation**
Skips see **Hoisting**
Southern Coal Producers' Assn. Annual meeting.....Dec 150
Sprays, Dust Allaying see **Safety**
Steel
Blast furnace—steel industry's largest blast furnace to be built by Arthur G. McKee & Co. (N).....Oct 66
Solid still—coke and coal for iron smelting (CC).....Oct 11
Stoppings see **Ventilation**
Stripping
Amphibious pump carrier simplifies strip pit dewatering (OI).....Jan 118
Applying new alloy steel for lower strip maintenance at Hanna Coal. Hyslop & Kleckner.....Feb 126
Applying rippers to reduce rock - breaking cost (OI) Aug 124
Approaches to automation highlight developments in 1958.....Feb 80
Avon Coal's strip process highlighted by 40:1 ratio and feldspar jig.....May 110
Big bulldozer spearheads low-cost stripping at Big Valley Nov 96
Bituminous stripping percentage up in 1958 (CC) Mar 11
Building for better mining at Sullivan Trail Coal Co. June 108
Coal Age Mining Guidebook—Guide to better stripping July 272-293
Coal loading—Coal Age Mining Guidebook—Guide to better stripping.....July 286
Continued opportunity (E) Aug 67
Dave Johnston plant provides more coal—based power in the West.....Oct 74
Digging deeper at lower cost at Hart & Hart Coal Co..Jan 82
Dozer converted to pumper (OI).....Jan 118
Drainage—Coal Age Mining Guidebook—Guide to better stripping.....July 293
Dredge stripping at Westfield, Kinglassie, Scotland...Sept 81
Electricity—Coal Age Mining Guidebook—Guide to better stripping.....July 290
High quality strip and auger coal meets today's market requirements.....Apr 84
The Kopuku story.....Feb 122
New seismic technique simplifies strip overburden analysis (charts).....Dec 102
Overburden—Coal Age Mining Guidebook—Guide to better stripping.....July 276
Peabody Coal's efficient thin-seam stripping serves utility market.....May 80
Peabody's strip-mine engineering for big-shovel operations. W. A. Weimer (charts & table).....Mar 98
Preserving structure (CC) Sept 11
Seisms in stripping (CC) .Nov 11
Simco Peabody's Coal Chief—Million tons per year: goal at Coshocton mine....July 108
Strip flying (CC).....Jan 11
Thin-coal stripping with bulldozer and dragline...Sept 106
Transportation — Coal Age Mining Guidebook—Guide to better stripping.....July 287
Two-seam loading made easier with redesigned shovels (OI) Sept 122
Wheel excavator—new Koibe wheel moves 2 million yards per month.....Aug 82
World's largest shovel (CC) June 11
Supervision see **Foremen, Management**
Supplies
Bus is portable shop and office (OI).....Nov 144
Coal Age Mining Guidebook—Profitable supply control July 329-336
Computers (CC).....Aug 11
Crossover eases supplying (OI) Jan 118
Knowing your oxygen cylinders (OI).....Aug 126
Supplies see also **Stripping**
Sweden
Explosion warning device (N) Aug. 36

T

Taxation
Glen Alden Corp. tax cut allowed (N).....Feb 60
Telephones see **Communications**
Timbering see **Roof Support**
Track see **Transportation**
Training
Coal Age Mining Guidebook—Training: vital to progress July 342-346
Education . . . a vital period (N).....July 26
How to modernize coal management. W. A. Raleigh, Jr. June 74
The importance of training for leadership.....July 128
Needed step (E).....Nov 69
New mechanics school (N) Jan 56
Penn State workshops pioneer in management training for coal.....June 74
Scholarship awards to promising students (N).....July 26
So you didn't go to college! Feb 134
Youth takes a look at mining (N).....Nov 26
Transportation
Barged coal due for bigger marketing role. W. A. Raleigh, Jr. (tables) (map) Apr 78
Car stop has tie catcher (OI) June 164
Coal Age Deep-Mining Guidebook.....July 245
Cover for controls prevents bulldozer tampering (OI) Jan 120
Critical link—shuttle car and transfer unit.....July 11
Expanded line (CC).....Apr 11
Experimental shipment of East Kentucky coal to Florida in phosphate cars may spark two-way haul (N).....Feb 62
Fast and continuous (CC) .Jan 11
Helicopter saves executives' time, results in better supervision.....Oct 87
How to choose the right tractor shoe (OI).....Sept 120
Making a better loading point Apr 96
Miniature equipment boosts production in low-coal mines Jan 86
Modernized hauling and dumping slash costs at Island Creek's No. 25 mine Mar 94
Old belt makes better wire guard (OI).....June 162
Overseas flashes (CC)....Feb 11
Poland solves problem of hydraulic transportation of coal (N).....Nov 42
Pushbutton - controlled retarders for railroad cars at U. S. Steel's Corbin plant Feb 118
Shipping costs unite Tampa Electric Co., Peabody Coal Co., Virginia-Carolina Chemical Co. (N).....Dec 28
"Turnover" conveyor belt system used for long-distance hauling (N).....Jan 54
Transportation see also **Conveyors, Hoisting, Stripping, Pipelines**
Treatment, Oil, Water see **Preparation**
Trucks, Trucking see **Stripping, Transportation**

U

United Mine Workers of America
After Lewis, what? (E)....Mar 65

Coal Age Index, Vol. 64, January-December, 1959

Award of $400,000 damages to Meadow Creek Coal upheld by the United States Court of Appeals (N) ..... Mar 42
Coal prices—fluid after new contracts (N) ..... Feb 26
Contracts signed with two of the largest rail mines in Harlan County, Ky. (N) Sept 64
Miners get pay hike (N) .. Jan 26
Osborn Mining and Love & Amos Coal awarded quarter-million dollar judgment in U. S. District Court (N) Mar 42
Strikes shut mines in Harlan County, Ky. (N) ..... Apr 30
Suit filed by Isom Coal Co. charges violation of Sherman Act (N) ..... Sept 66
Welfare Fund—annual report (N) ..... Nov 30
U. S. Bureau of Mines see Bureau of Mines
Utilization
American Electric Power System's Kammer plant in full operation ..... May 56
BCI holds markets (N) .. Jan 28
BCR utilization research program re-appraised at annual meeting ..... June 154
Baltimore & Ohio R. R. buys coal boilers (N) ..... Nov 30
Barged coal due for bigger marketing role. W. A. Raleigh, Jr. (tables) (map) Apr 78
Chemicals from coal—direct manufacture nears reality July 98
Coal for electric power: 1958—origins and points of use, by States (tables) ..... Apr 116
Coal for steel . . . the future of direct reduction. W. A. Raleigh, Jr. ..... Mar 66
Coal fortified road pavement material developed by Curtiss-Wright (N) ..... June 30
Coal-tar compound—boon to man (CC) ..... May 11
Coal utilization—more and more (CC) ..... May 11
Con Ed proposal to switch from coal, buy gas from field for New York City plant, turned down by FPC (N) ..... Mar 42
Consolidation Coal Co. and Standard Oil of Ohio agree to begin joint research on methods of making hydrocarbon liquid fuels from coal (N) ..... Feb 28
Cut coal rate offered Consolidated Edison of New York (N) ..... Apr 72
Easy task—supporting electrical home heating (CC) Nov 11
Electric coal (E) ..... Jan 69
Experimental plant to convert coal into heating gas or gasoline under discussion at the Bureau of Mines (N) Feb 62
Experimental shipment of East Kentucky coal to Florida in phosphate cars may spark two-way haul (N) ..... Feb 62
First highway using coal-base mixture laid in Ky. (N) . Oct 66
Heating federal buildings with coal saves half a million annually ..... Oct 66
Japanese steel mills sign contracts for Australian coal (N) ..... Mar 36
Joint corporation established to produce chemicals from mining wastes and residual products (N) ..... June 28
Korea saves $20 million with switch to anthracite (N) July 56
Lignite uses to be explored by University of North Dakota (N) ..... Sept 64
Low-grade coal key for boosting power potential in Missouri River Basin (N) .. July 58
New growth patterns for coal . . . electric heat comes of age. W. A. Raleigh, Jr. .. Jan 70
New opportunity for early return on investment in development of the coal-fired gas turbine (CC) ..... Apr 11
Pennsylvania Electric Co. will step up coal use 50% within next 2 yr (N) ..... Feb 62
Smelting studied (N) ..... Jan 50
Smut-forming deterrent device proves useful at British Petroleum Co. (N) .... Aug 36
Solid still—coal for iron smelting (C) ..... Oct 11
Soviet progress (N) ..... Sept 50
Steam-electric turbine-generator unit hits electrical output capacity peak at Detroit Edison's River Rouge plant (N) ..... Mar 41

V

Ventilation
The ABC's of ventilation for continuous miners (report) Feb 96
Benefits and control of multiple-fan ventilation. Boyle & Conn ..... Jan 96
Coal Age Deep-Mining Guidebook ..... July 254
Computer solves air problems (CI) ..... July 134
Fan-indicating devices for mine service. W. C. Kegel (charts) (OI) ..... Nov 144
New portal . . . higher TPM, better ventilation at Barnes & Tucker's Lancashire No. 15 mine (chart) ..... Sept 110
Salable methane? (CC) .. May 11

W

Waste Disposal see Refuse Disposal
Water Handling see Drainage, Preparation
Water Pollution
AIME discusses water classification, mine pollutants .Nov 126
Shorter deadline (E) ..... Sept 72
W. Va. water (CC) ..... Nov 11
Water Treatment see Preparation
Welding
Helpful suggestions for safer, more efficient welding (OI) Feb 142
Maintaining your welding and cutting outfit ..... Sept 86
Safety reminder—never oil oxy - acetylene apparatus (OI) ..... Sept 120
Western Pennsylvania Safety Association Engineering Conference ..... June 144
Western Virginia Coal Mining Institute
Joint W. Va. CMI-AIME meeting ..... June 148

COMPANY INDEX

Alabama Power Co.
How to handle heavy pipe (OI) Dec 158
Avon Coal Co., Ltd.
40:1 ratio and feldspar jig highlight Avon strip process May 110
Badger Coal Co.
Badger Coal's modern preparation undergirds productive mining. A. E. Flowers May 70
Baltimore & Ohio Railroad
Buys automatic coal boilers (N) ..... Nov 30
Barnes & Tucker Co.
New portal . . . higher TPM, better ventilation ..... Sept 110
Bethlehem Mines Corp.
Better dust collection with a packaged unit. Cressman & White ..... June 92
Full pillaring with the boring-type miner. Hoard & Cressman ..... Mar 74
Mine No. 22, mine rescue champs (N) ..... Nov 66
Big Valley Coal Co.
Big bulldozer spearheads low-cost stripping at Big Valley Nov 96
Bituminous Coal Research, Inc.
Annual meeting ..... June 154
Award made to Drs. James D. Batchelor and Everett Gorin (N) ..... June 63
Bituminous Coal Research lends turbine to Bureau of Mines (N) ..... May 23
New officer and board members elected ..... June 155
Boone County Coal Corp.
Conveyor crossover eases supplying (OI) ..... Jan 118
Crossover eases supplying (OI)
Bous Fertilizer Co. Jan 118
Purchases Mark Twain Coal Co. (N) ..... Feb 60
Bowie Coal Co.
Profitable thin-coal stripping with bulldozer and dragline Sept 106
Brimac Corp.
New concern buys mineral rights near Carbonton, N. C. (N) ..... Jan 54
Central West Coal Co.
Will operate new mine in Blackwater coal field, W. Va. (N) ..... Oct 66
Chafin Coal Co.
High-tonnage punch mining Jan 104
Clinchfield Coal Corp.
Compass No. 1 team, first-aid champs (N) ..... Nov 66
Moss No. 3—automation keys two-stage precision washing July 80
Moss No. 3: Clinchfield's bid for world's largest mine. July 72
Coal Cliff Colliery
Australia's largest preparation plant goes into operation at Coal Cliff Colliery (N) . May 38
Consolidation Coal Co.
Agrees to begin joint research with Standard Oil of Ohio on methods of making hydrocarbon liquid fuels from coal (N) ..... Feb 28
David H. Davis receives Distinguished Alumnus award (N) ..... June 11, July 56
Consolidation Coal Co. Research and Development Div.
Drs. James D. Batchelor and Everett Gorin receive Bituminous Coal Research award (N) ..... June 63
Richard Costain, Ltd.
Dredge stripping at Westfield, Kinglassie, Scotland . . . Sept 81
Curtiss-Wright Corp.
Coal-fortified road paving material developed (N) .. June 30
Duquesne Light Co.
Lampboard in shop monitors outlying substations (OI) Apr 196
Making a better loading point Apr 96
Dynamics Reading Chemicals, Inc.
Formed for direct manufacture of chemicals from coal; merger of General Dynamics Corp. and Philadelphia & Reading Corp. ..... July 98
Eastern Coal Corp.
Better cable protection with circuit interrupters. . . . Nov 91
Eastern Gas & Fuel Associates
Coal research lab expansion completed (N) ..... Oct 28
New facilities cut oil-distribution cost (OI) ..... Apr 194
Old belt makes better wire guard (OI) ..... June 162
Eastern Gas & Fuel Associates—Kopperston, W. Va. mine
Coking coal—record shipment headed for Brazil (N) .. Aug 28
Elk Creek Coal Co.
Mining properties and leaseholds acquired by Island Creek Coal (N) ..... Mar 41
Elk River Coal & Lumber Co.
Purchased by Pittston Co. (N) Jan 54
Ford Coal Co.
"Truck - mine" designed cutting machine boosts efficiency in low seams . . . June 90
Freeman Coal Mining Corp.
Orient No. 3's entrainment dryer cuts 10M moisture economically (chart) (table) Aug 102
General Dynamics Corp.
Joint corporation established to produce chemicals from mining wastes and residual products (N) ..... June 28
Merged with Philadelphia & Reading Corp. for direct manufacture of chemicals from coal ..... July 98
Glen Alden Corp.
Tax cut allowed (N) ..... Feb 60
Guyan Eagle Co.
Mining properties and leaseholds acquired by Island Creek Coal (N) ..... Mar 41
Hanna Coal Co.
Applying new alloy steel for lower strip maintenance. Hyslop & Kleckner .... Feb 126
Automatic trolley-wire lubricator saves time (OI) .. May 122
Better hanger stops cable sagging (OI) ..... May 124
Car stop has tie catcher (OI) June 164
Planned maintenance doubles engine life, reduces downtime (tables) ..... June 82
Harmon Creek Coal Corp.
Screen conversion eliminates blinding (OI) ..... Mar 118
Harnischfeger Corp.
Celebrates completion of first 75 yr of operation (CC) . Feb 11
Hart & Hart Coal Co.
Amphibious pump carrier simplifies strip pit dewatering (OI) ..... Jan 118
Digging deeper at lower cost Jan 82
Dozer converted to pumper (OI) ..... Jan 118
Hi Hat Elkhorn Coal Co.
Bought by a group headed by John R. Fields (N) . . . Sept 30
Indiana & Michigan Electric Co.
Piggyback generator saves gas. D. E. Schuck (OI) ..... Aug 124
Ingle Coal Corp.
Three units feed one loading point at Ditney Hill . . . Sept 100
Inland Steel Co.
Deliming and heat drying. R. M. Grimm ..... Mar 104
Ireland Mine
Control guard prevents accidents (OI) ..... May 124
Island Creek Coal Co.
Acquires mining properties and leaseholds of Guyan Eagle Co. and Elk Creek Coal Co. (N) ..... Mar 41
Conveyor system to transport bituminous coal ordered (N) Apr 28
Finishes Coal Research Center at Holden, W. Va. (N) Mar 42
Modernized hauling and dumping ..... Mar 94
Raymond E. Salvati receives West Va. "Son of the Year" award (CC) ..... June 11
Virginia Coal & Iron Co.
Sells Interstate Railroad Co. (N) ..... July 28

Warner Collieries
Merger with North American Coal planned (N).....Apr 28
Wind Rock Coal & Coke Co.
Pioneers new underground auger.....Nov 76
Youghiogheny & Ohio Coal Co.
Purchases highly automatic dumping system for its Nelms No. 2 mine (N)..Feb 60
Youngstown Coal Pipe Lines Co.
To construct coal pipeline from East Liverpool to Youngstown, Ohio (N).Jan 54
Wyoming plant upgrading fragile coal to premium metallurgical product..Sept 94
Isom Coal Co.
Sues United Mine Workers of America (N).....Sept 66
Johnstown Coal & Coke Co.
Dry cleaning and washing fines at Crichton No. 4 mine Mar 88
Jones & Laughlin Steel Corp.
Central circuit-scanning system monitors and controls outlying units. W. G. Kegel Oct 102
Remote control for continuous miner boosts safety in pillar extraction. W. G. Kegel (charts).....Aug 98
To get steel industry's largest blast furnace (N).....Oct 66
Joy Mfg. Co.
Scholarship awards to promising students (N).....July 26
Knox Coal Co.
Pa. mine flood traps 12 men (N).....Mar 28
Probe of flood disaster indicts 7 for involuntary manslaughter (N).....Oct 66
Probers of flood disaster urge new mine laws (N)....Sept 26
Kocher Coal Co.
Flexibility, efficiency, economy mark Kocher heavy-media plant (chart).....Oct 114
Love & Amos Coal Co.
Awarded judgment in U. S. District Court against the UMW and its District 19 (N).....Mar 42
M & O Coal Co.
Raw coal quality control pays off for M & O. W. A. Raleigh, Jr.....Oct 80
Mark Twain Coal Co.
Sold to Boss Fertilizer Co. (N) Feb 60
Meadow Creek Coal Co.
Award of $400,000 damages against the UMW upheld by the United States Court of Appeals (N).....Mar 42
Michigan-Wisconsin Pipeline Co.
Renews application to pipe natural gas into midwest from Canada (map) (N) Aug 26
Midwestern Gas Transmission Co.
Renews application to pipe natural gas into midwest from Canada (map) (N) Aug 26
Montana Power Co.
Buys coal lands near Colstrip, Mont. (N).....July 56
Mountaineer Coal Co.
Loveridge story
Mining at Loveridge..Dec 78
Preparation at Loveridge Dec 92
North American Coal Corp.
Coal dock sold to C.Reiss Coal Co. (N).....June 30
Merger with Warner Collieries planned (N).....Apr 28
North Western-Hanna Fuel Co.
Opportunity for coal: regional selling of coal-burning equipment. Martin Burke, Jr. Aug 68
Northern Pacific Railway Co.
Agrees to supply to Handford Works at AEC's low bid price (N).....Oct 66
Sells coal lands near Colstrip, Mont. (N).....July 56
Oglebay Norton Co.
Burton mine accident attributed to ignition of explosive gas by an electric arc or spark (N).....Feb 58
Buys W. Va. Div. of Truax-Traer Coal Co. (N)....Oct 63
Old Ben Coal Corp.
Wireless control of 33,000-V power.....Mar 82
Omar Mining Co.
New fine-coal plant strengthens Omar's market position. Daniel Jackson, Jr.....Apr 102
Osborn Mining Co.
Awarded judgment in U. S. District Court against the UMW and its District 19 (N).....Mar 42
Pacific Power & Light Co.
Dave Johnston plant provides more coal-based power in the West.....Oct 74
Peabody Coal Co.
Awarded TVA contract, largest contract ever received by a single coal company (N).....Nov 28
Buys Sunnyhill Coal Co. and Sunnyhill Coal Sales Co. (N) Sept 28
Efficient thin-seam stripping serves utility market..May 80
Electronic miner may open new doors to coal (N)..May 26
Engineers redesign shovels for 2-seam loading at River Queen mine (OI).....Sept 122
NLRB decides in favor of employees (N).....Sept 66
Strip-mining engineering for big-shovel operations. W. A. Weimer (charts & table) Mar 98
Philadelphia & Reading Corp.
Joint corporation established to produce chemicals from mining wastes and residual products (N).....June 28
Merged with General Dynamics Corp. for direct manufacture of chemicals from coal.....July 98
Pine Township Coal Co.
Tipple and cleaning plant destroyed by fire (N)..Feb 60
Pittsburgh & Midway Coal Mining Co.
National Safety Council award presented to workers of Mine No. 19 (N)...June 28
"Turnover" conveyor belt system used for long-distance hauling (N).....Jan 54
Pittsburgh Coal Co.
Plastic cables for deep mining at Pittsburgh Coal. C. W. Parisi & others.....Apr 122
Scholarship awards won by Regis Smith and Vernon Smith (N).....Sept 64
Pittston Co.
Purchases Elk River Coal & Lumber Co. (N).....Jan 54
Pocahontas Fuel Co.
Disaster at McDowell County mine, W. Va., caused by explosive charge which ignited methane gas (N)..Feb 58
Powellton Coal Co.
Merged with Princess Elkhorn Coal Co. to form Princess Coals, Inc. (N).....Feb 28
Powhatan Mining Co.
Low-cost highwall mining. A. D. Henry.....Feb 104
Princess Coals, Inc.
Formed by merger of Princess Elkhorn Coal Co. and Powellton Coal Co. (N).Feb 28
Preventive maintenance: a positive approach. Daniel Jackson, Jr.....Nov 84
Princess Elkhorn Coal Co.
Merged with Powellton Coal Co. to form Princess Coals, Inc. (N).....Feb 28
Scholarship awards to promising students (N).....July 26
RB Coal Co.
Miniature equipment boosts production in low-coal mines Jan 86
C. Reiss Coal Co.
Coal docks purchased from North American Coal Co. (N).....June 30
Sahara Coal Co.
Gives 25 scholarships to Southern Illinois University students (N).....Sept 30
Shawville Coal Co.
Helicopter saves executives' time, results in better supervision.....Oct 87
Simco Peabody Co.
Coshocton mine—Million tons per year: goal for 70-yd Coal Chief.....July 108
Slab Fork Coal Co.
How central-shop facilities and services pay off at Slab Fork Coal.....May 104
Southern Railway Co.
Buys Interstate Railroad Co. (N).....July 28
Sullivan Trail Coal Co.
Building for better mining June 108
Sunnyhill Coal Co.
Sold to Peabody Coal Co. (N) Sept 28
Swaney, B. H., Inc.
High quality strip and auger coal meets today's market requirements.....Apr 84
Tioga Coal Corp.
Fire damage estimated at $750,000 (N).....July 58
Truax-Traer Coal Co.
Sells its W. Va. Div. to Oglebay Norton Co. (N)....Oct 63
United Electric Coal Cos.
Koibe wheel moves 2 million yards per month at Cuba No. 9 mine.....Aug 82
U. S. Steel Corp.
Benefits and control of multiple-fan ventilation. Boyle & Conn.....Jan 96
Improving coking coal quality. R. M. von Storch.....Feb 112
Pushbutton - controlled retarders for railroad cars.Feb 118
United States Steel Foundation, Inc.
Fellowship renewed for Thomas V. Falkie (N).June 63

AUTHOR'S INDEX

Anderson, R. L. & W. H. Young
Sales of coal-mine equipment —1958.....Feb 90
Thermal drying of coal..June 114
Baer, F. H.
New outlook for communist coal.....Apr 42
Blandford, Thomas & others
Plastic cables for deep mining at Pittsburgh Coal.....Apr 122
Boyle, J. A. & O. S. Conn
Benefits and control of multiple-fan ventilation....Jan 96
Burke, Martin, Jr.
Opportunity for coal: regional selling of coal-burning equipment.....Aug 68
Conn, O. S. & J. A. Boyle
Benefits and control of multiple-fan ventilation....Jan 96
Constantine, Marc T. & others
Pipeline gas from char via the Lurgi process (tables) (charts).....Aug 92
Cressman, C. S. & C. M. Hoard
Full pillaring with the boring-type miner.....Mar 74
Cressman, C. S. and J. C. White
Better dust collection with a packaged unit.....June 92
Davis, Nelson L.
Designing for low-cost coal preparation.....Apr 126
Diller, N. Richard
How to improve communications.....Sept 74
Durrett, Harold L.
How to make better decisions July 114
Faber, John H. & others
Pipeline gas from char via the Lurgi process (tables) (charts).....Aug 92
Flowers, Alfred E.
Badger Coal's modern preparation undergirds productive mining.....May 70
Grimm, R. M.
Desliming and heat drying Mar 104
Haldane, Bernard
Three steps to greater success Jan 114
Hamilton, D. E.
Designs for efficient, safe, AC power systems.....June 98
Henry, A. D.
Low-cost highwall mining.Feb 104
Hewes, R. B.
Motivation — a management "must".....Jan 90
Hoard, C. M. & C. S. Cressman
Full pillaring with the boring-type miner.....Mar 74
Hugus, F. R.
AC cables for coal
Pt 1 Selection, manufacture, testing.....Nov 104
Pt 2 Installation, use, maintenance.....Dec 128
Hyslop, Andrew & D. S. Kleckner
Applying new alloy steel for lower strip maintenance Feb 126
Jackson, Daniel, Jr.
New fine-coal plant strengthens Omar's market position Apr 102
Organizing for better maintenance (report).....Aug 72
Preventive maintenance: a positive approach.....Nov 84
Katell, Sidney & others
Pipeline gas from char via the Lurgi process (tables) (charts).....Aug 92
Kegel, W. G.
Central circuit-scanning system monitors and controls outlying units.....Oct 102
Fan-indicating devices for mine service.....Nov 144
Remote control for continuous miner boosts safety in pillar extraction (charts).....Aug 98
Kleckner, D. S. & Andrew Hyslop
Applying new alloy steel for lower strip maintenance Feb 126
MacWilliams, F. Fraser
Helpful hints on applying centrifugal pumps.....Nov 100
McBride, J. V. & others
Plastic cables for deep mining at Pittsburgh Coal.....Apr 122
Parisi, C. W. & others
Plastic cables for deep mining at Pittsburgh Coal.....Apr 122
Rafia, E. S.
Insulated connector resists corrosion (OI).....July 134
Raleigh, W. A., Jr.
Barged coal due for bigger marketing role.....Apr 78
Coal for steel ... the future of direct reduction.....Mar 66
Fuel cell prospects and How to modernize coal management.....June 74
New growth patterns for coal ... electric heat comes of age.....Jan 70
Planning for growth in the industrial and commercial market (table).....Nov 70
Raw coal quality control pays off for M & O Coal Co..Oct 80
Schuck, D. E.
Piggyback generator saves gas (OI).....Aug 124
von Storch, R. M.
Improving coking coal quality Feb 112
Wang, K. P.
Coal research and techniques in Communist China...Oct 110
Weichel, Thomas R.
Cable for AC underground ... choice and installation.May 90
Weimer, W. A.
Strip-mine engineering for big-shovel operations.....Mar 98
White, J. C. and C. S. Cressman
Better dust collection with a packaged unit.....June 92
Young, W. H. & R. L. Anderson
Sales of coal-mine equipment —1958.....Feb 90
Thermal drying of coal..June 114

PROFESSIONAL SERVICES

ALLEN & GARCIA COMPANY
40 Years' Service to the
Coal and Salt Industries and Consultants
Construction Engineers and Managers
Authoritative Reports and Appraisals
332 S. Michigan Ave., Chicago
120 Wall Street, New York City

THERON G. GEROW
Mining Consultant and Engineer
3033 Excelsior Blvd. Minneapolis 16, Minnesota

MOTT CORE DRILLING CO.
Contractors
Exploration of Coal Properties. Guarantee satisfactory coal cores. Inside Mine Drilling. Pregrouting, Mine Shafts, Large diameter holes.
Huntington 17, W. Va.

AMERICAN AIR SURVEYS, INC.
TOPOGRAPHIC MAPS FOR MINING
AERIAL PHOTOGRAPHS
907 Penn Ave., Pittsburgh 22, Pa.
A NATIONWIDE SERVICE

HOFFMAN BROS. DRILLING CO.
Drill Contractors Since 1902
Specialists in exploratory—grout hole and pressure groutings. Rigs located in over 50 strategic areas for prompt service. Free estimates.
104 Cedar St. Punxsutawney, Penna.

DAVIS READ
Consulting Engineer
Layout — Operation
Modern Production Methods
Plant Design — Preparation
120 S. La Salle St. Chicago 3, Ill.

GEO. S. BATON & COMPANY
"Founded 1900"
Consulting Engineers
Cost Analysis — Valuations
Mine and Preparation Plant Designs
1100 Union Trust Building Pittsburgh 19, Pa.

KIRK & COWIN, INC.
Ralph E. Kirk Percy G. Cowin
Registered Professional Engineers
Consulting—Reports—Appraisals
Mechanical Mining of Ore & Coal
Management and Contruction of Mines
1—19th St., SW—Birmingham, Ala.
Phone St 6-5586

ROBINSON & ROBINSON
Consulting Engineers
Mine Operation—Preparation
Coal Property Valuation
Industrial Engineering
Union Bldg. Charleston, W. Va.

C. Ed BERRY
Coal Preparation Engineer
SPECIALIZING
OIL TREATING—FREEZE PROTECTION
BULK DENSITY & HANDLING
702 Benoni Ave., Fairmont, W. Va. - Ph. 4592

HERBERT S. LITTLEWOOD
Consulting Electrical Engineer
Evergreen Hills Irwin, R.D. #3, Penna.

PAUL WEIR COMPANY
Established 1916
Mining Engineers & Geologists
DESIGN AND CONSTRUCTION
INDUSTRIAL ENGINEERING
20 North Wacker Drive Chicago 6, Illinois

EAVENSON, AUCHMUTY & GREENWALD
Mining Engineers
COAL OPERATION CONSULTANTS
VALUATIONS
2720 Koppers Bldg. Pittsburgh 19, Pa.

J. B. MORROW
Coal Consultant
Oliver Building Pittsburgh, Pa.

J. W. WOOMER & ASSOCIATES
Consulting Mining Engineers
Modern Mines Systems and Designs
Foreign and Domestic Mining Reports
Oliver Building—Mellon Square, Pittsburgh, Penna.

HOW ARE YOUR COMMUNICATIONS?

Have you tested your company publications lately? Do they really *work* for you? Today your entire operation is judged by each piece of literature you produce. If you have any doubt as to the impact of your vital communications, remember . . .

COMMUNICATION IS OUR BUSINESS

TWS will write, design, and print your Instruction Manuals, Product Bulletins, Training Aids, Industrial Relations Literature, Annual Reports, Company Histories, etc. Save money and time. Let *our* staff be your staff for Technical and Business publications.

TECHNICAL WRITING SERVICE
McGraw-Hill Book Co.
330 West 42nd Street, New York 36, N. Y.
Phone: LOngacre 4-3000

This service is available through ad agencies.

CLASSIFIED SEARCHLIGHT SECTION ADVERTISING

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

DISPLAYED RATE:
The advertising rate is $12.50 per inch for Equipment and Business Opportunity advertising appearing on other than a contract basis. Contract rates quoted on request.

EMPLOYMENT OPPORTUNITIES—$26.00 per inch, subject to agency commission.

INFORMATION:
DISCOUNT OF 10% in full payment is made in advance of four consecutive insertions of undisplayed ads (not including proposals). EQUIPMENT WANTED OR FOR SALE Advertisements acceptable only in Displayed Style. AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches to a page.

UNDISPLAYED RATE:
$1.50 a line, minimum 3 lines. To figure advance payment count 5 average words as a line.

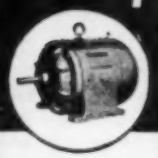
POSITION WANTED undisplayed advertising rate is one-half of the above rate payable in advance.

BOX NUMBERS count as 1 line additional.

Send New Advertisements or Inquiries to Classified Advertising Div. of Coal Age, P. O. Box 12, New York 36, for January issue closing Dec. 15th.

POWER EQUIPMENT CO. Offers

BARGAIN PRICES



ON GUARANTEED NEW and Rebuilt MOTORS!

DEC. SPECIALS

GUARANTEED REBUILT MOTORS
230 Volt DC Compound Wound
Unless Otherwise Noted

HP	MAKE	TYPE	SPEED
100	West. S.B. Open	SK-142L	1800
100	West. S.B. Open	SK-170	900
75	West. S.B. Open	SK-140L	1800
75	West. S.B. Open	SK-160	900
60	Al. Chal. S. B. Drip	BE-131	1200
45	G.E.S.B. Open, Shunt	CL-14	1200
40	Century B.B. Drip-Now	DN-375	1800
30	West. S.B. Open, Shunt	SK-113	1200
25	West. S.B. Open	SK-100L	1200
25	G.E.B.B. Shunt	CD-93	1200
15	G.E.B.B. Splash	CD-85	1800
10	West. B.B. Drip.	SK-43	1800
10	West. B.B. Drip.	CSP-324	1800
7½	G.E. T.E.F.C. B.B. Now	3-284	1800
5	L.A.B.B. Drip	OGNA-254	1800

Send for our FREE Catalog

Cash for your surplus new & used electric equipment. Send your list today.

Large line of motors, control equipment, AC & DC Generators, MG sets and transformers.

Phone or Wire Us Collect

POWER EQUIPMENT CO.
8 Cairn St., Rochester 2, N. Y.
Phone BEverly 5-1662

RUBBER PRODUCTS for IMMEDIATE DELIVERY

CALL, WIRE or WRITE
CARLYLE
THE RUBBER HEADQUARTERS

LOW PRICES, DEPENDABLE QUALITY FOR 40 YEARS

WHAT EVER YOUR RUBBER NEEDS ARE ! !

AIR HOSE	HYDRAULIC HOSE
WATER HOSE	OIL HOSE
SUCTION HOSE	WELDING HOSE
DISCHARGE HOSE	VACUUM HOSE
STEAM HOSE	DREDGE SLEEVES
PILE DRIVER HOSE	SAND SUCTION HOSE

CONVEYOR BELTING
ELEVATOR BELTING
"V" BELTS

Write for complete catalogue

CARLYLE RUBBER CO., INC.
103-107 WARREN ST. Digby 9-3810 NEW YORK, N. Y.

EXPLOSIVES SALES

Excellent opportunity for young graduate engineer with explosives or mining experience to join the Industrial Chemicals Division of Spencer Chemical Company. The person selected will sell and promote the sale of prilled ammonium nitrate for its use as a blasting agent. This is a permanent position offering considerable opportunity to advance with an expanding organization.

In reply, please send resume of experience, education, age and salary requirements to:

Personnel Manager
Spencer Chemical Company
610 Dwight Building
Kansas City, Missouri

HEAVY EXCAVATION EQUIPMENT

DRAGLINES, SHOVELS, CRANES, DRILLS, TRUCKS

15-W Bucyrus Erie Elec. Drag, 215', 12 yd.
450-W Bucyrus Erie Diesel Drag, 165' with extra 10, 12, 13 and 14 yd. buckets.
9-W Bucyrus Erie Elec. Drag, 165', 10 yd.
9-W Bucyrus Erie Diesel Drag, 165', 12 yd.
7-W Bucyrus Erie Elec. Drag, 140', 7 yd.
7-W Bucyrus Erie Diesel Drag, 140', 7 yd.
7400 Marion Diesel Drag, 175', 13 yd.
625 Page Diesel Drag, 150', 10 yd.
621-5 Page Diesel Drag, 125', 7 yd.
200-W Bucyrus Erie Diesel Drag, 125', 6 yd.
5-W Bucyrus Erie Diesel Drag, 100', 6 yd.
2400 Lima Dragline, 130', 5 yd.
4500 Manitowoc Drag, 120', 5 yd.
120-B Bucyrus Erie Elec. Drag, 115', 5 yd.
111-M Marion Drag, 100', 4 yd.
1601 Lima, 4 yd. Shovel/Drag
3900, 3500 & 3000 Manitowoc Cranes
5560 Marion 26 Yd. Elec. Shovel
5480 Marion 18 Yd. Elec. H.L. Shovel
151-M Marion 7 Yd. Elec. Shovel
170-B Bucyrus Erie 6½ Yd. Elec. Shovel
4161 Marion 6 Yd. Elec. Shovel
2400 Lima 4½ and 5½ Yd. H.L. Shovels
120-B Bucyrus Erie 4 Yd. Elec. Shovel
4500 Manitowoc 5 Yd. H.L. Shovel
1201 Lima 3½ Yd. Standard Shovel
111-M Marion Standard & H.L. Shovels
3500 Manitowoc Standard & H.L. Shovels
54-B Bucyrus Erie Standard & H.L. Shovels
Large selection of smaller Shovels & Draglines
Model T-650 Reich Heavy Truck Mounted Rotary and Down-The-Hole Drill
McCarthy & Compton Coal Auger Drills
Euclid Trucks, Truck Cranes, Dozers, Attachments

FRANK SWABB EQUIPMENT CO., INC.
313 Hazleton Nat'l Bank Bldg.
Hazleton, Pa. GLadstone 5-3658

ADDRESS BOX NO. REPLIES TO: Box No. Classified Adv. Div. of this publication. Send to office nearest you.
NEW YORK 36: P. O. BOX 12
CHICAGO 11: 520 N. Michigan Ave.
SAN FRANCISCO 4: 68 Post St.

POSITION VACANT

Mining or Civil Engineer. Graduate student or young engineer with aptitude and desire for development in layout and design work. Attractive opportunity in Midwest Coal Field. F-3142, Coal Age.

SELLING OPPORTUNITY AVAILABLE

Coal Salesmen—Experienced, contacting accounts in Western Pennsylvania, Western New York State, Eastern Seaboard. Company established over 30 years. Compensation open. Replies in confidence. Send complete resume with picture to SW-2924, Coal Age.

FOR SALE

For Sale—Diamond core drill. Claire J. Davis, Dysart RD, Pa.

FOR SALE

Permissible DC motors and controls out of 2 year old 11BU converted to AC.
150 KW Westinghouse MG set 2400/275
Mr. Llewellyn
Mid-Continent Coal and Coke Company
Carbondale, Colorado

FOR SALE BELOW COST

CONVEYOR BELTS

New 600 Foot Lengths U. S. Giant Underground Coal Conveyor Belts 5-Ply, 28 Ounce, 30 Inch, Rubber

The New River Co.
Mount Hope, W. Va. Tel. TR 7-6521

WANTED

One McNally Cascade Fine Coal Dryer with all connecting facilities and furnace for drying 50 tons of coal per hour ⅜" x 0" containing about 7% surface moisture reduce it to 3%.

W-2987 Coal Age
Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

ELECTRIC AND MACHINE SUPPLY COMPANY

Largest Supplier of the Best Rebuilt Mining Equipment

JOY TRACKLESS EQUIPMENT

1—1-3ICM-2CFM-S-1 Joy Continuous Miner
1—11BU Joy Cutting Machine
11—8BE-10 Joy Shuttle Cars
13—8BC-3CE Joy Shuttle Cars
1—8BC-1PE-1 Joy Shuttle Car, Elevating Discharge
6—5BC Joy Shuttle Cars
1—4BE Joy Shuttle Cars
8—3BE Joy Shuttle Cars
1—3BD Joy Shuttle Car
3—14BU-3CE Joy Loaders
1—14BU-7BE Joy Loader, Rebuilt
6—14BU-2E Joy Loaders, 29" O.H.
5—12BU-9E & 7E Joy Loaders
4—9BU Joy Loaders, A.C. & D. C.
2—2B BUI-3E Joy Loaders
1—T2-3AE Joy Machine Trucks
1—T2-2 Joy Machine Truck
3—T1 Joy Trucks, 220/440 V., A.C.
4—T2-2E & 2PE Joy Machine Trucks
7—PLII-7PE & 8PE Joy Elevators
1—WK-83 Joy Compressor, 240 cu. ft., Rubber Mounted, Self-propelled
1—CO25, Joy Coal Drill, Perfect
1—WL-82 Sullivan Compressor, 125 cu. ft., Rubber Mounted, Self-propelled
3—T12 Joy Supply Jeeps (Battery)
1—Lot Joy Motors and Armatures—9J, 10J, 23J, 24J, 38J, Etc.

MISCELLANEOUS TRACKLESS EQUIPMENT

1—70UR Jeffrey Cutting Machine
5—Long 88 Pig Loaders
1—386 Goodman Loader on Rubber
2—Myers Whaley 583 Loaders
1—Lee Norse Continuous Miner
1—210 cu. ft Acme Air Compressor
2—123 cu. ft. Acme Air Compressors
6—Manson Jeeps w/9J Motors

BELT CONVEYORS

1—48" x 983' Link Belt, Belt Conveyor, w/100 h.p. Drive
1,872'—36" 64A or B Jeffrey Belt Conveyor Structure
1,068'—36" Model "C" Joy Belt Conveyor Structure
3—36" Model "C" Joy Belt Conveyor Drives
1—30" x 800' Jeffrey 52B Belt Conveyor w/25 h.p. Tandem Drive
1—30" x 800' Goodman 97HC Belt Conveyor w/30 h.p. Tandem Drive
4—30" x 1,000' Goodman 99-5GT Belt Conveyors w/40 h.p. Tandem Drives
2—30" Goodman 99-5GT Tandem Belt Conveyor Drives, 40 h.p.
2—30" Joy MTB Tandem Belt Conveyor Drives, 25 h.p.
2—30" Goodman 97HC Tandem Belt Conveyor Drives, 30 h.p.
1—30" Shop Constructed Belt Conveyor Drive, 15 h.p.
675'—36" Barber Greene Belt Conveyor Structure
2—30" Jeffrey 52B Belt Conveyors, 1,000' centers
1—26" x 10,000' Joy Model "C" Overland Belt Conveyor, Complete
1—26" x 2,450' Joy MTB Belt Conveyor w/25 h.p. Tandem Drive
10,424'—26" Joy Model "C" Belt Conveyor Structure
18—26" Belt Conveyor Drives of various types
13—Tipple Belt Conveyors, various widths and lengths

CHAIN & SHAKER CONVEYORS

3—20" Joy Chain Conveyors, Permissible
4—15" Joy Chain Conveyors, Permissible
6—12" Long Chain Conveyors, 350' centers w/400 DBH Long Mobile Head
1—15" Barber Greene Portable Chain Conveyor for unloading railroad cars
23—12" & 15" Jeffrey Chain Conveyors 61EW, 61HG, 61W and 61AM
1—12" Goodman 90L Chain Conveyor
2—PT12 Long Piggyback Conveyors
2—PT15 Long Piggyback Conveyors
8—PT15-B Long Piggybacks, 5 h.p. motors
62—Goodman Power Duckbills and Duckbill Hoists, Model 427G
47—Goodman G12½, G15 and G20 Drives
7—Joy Ladel UN 17 Shaker Drives

SUB STATIONS & TRANSFORMERS

1—500KW G. E., MG Set
4—300KW MG Sets
2—200KW MG Sets
1—150KW G. E. Rotary Converter, w/Transformers
2—150KW Rotary Converters, Completely Automatic
15—150KV MG Sets of various makes and voltages
1—100KW Motor Generator Set
1—100KVA Gasoline Generator Unit
2—50KW, MG Sets, 125 V., D. C., 1200 rpm
2—Armatures for 150 and 200KW Rotary
2—600 & 800 Auto Transformers
138—Transformers from 5KVA to 500 KVA

CUTTING MACHINES

1—70URB Jeffrey Cutting Machine
1—11RU Joy Cutting Machine w/Bugduster
2—29B Jeffrey Cutting Machine
1—29C Jeffrey Cutting Machine
1—624 Goodman Slabber
4—7AU Sullivans
5—7B Sullivans
17—11B Sullivans, 35 & 50 h.p.
15—12AB & 12AA Standard Goodmans
3—112AA Universal Goodmans
8—312AA Baby Goodmans, 250 Volt
9—512 Goodman Cutting Machines, with Bugdusters
2—712 Goodman Cutting Machines, 250 V., D.C.
1—29U Jeffrey, 220/440 Volt, A.C. Rebuilt
3—33L Jeffrey Cutting Machines
49—33B and 35BB Jeffreys, A.C. & D.C. Bugdusters and Trucks available

LOCOMOTIVES

2—20 Ton MH77 Jeffreys, 42" t.g.
1—15 Ton HM82B G.E. Locomotive, 90 h.p. units, 44" O.H., 48" t.g., Excellent
5—15 Ton Locomotives, 250 V., any gauge
1—12 Ton 29B Goodman Locomotive, 40" O.H.
8—10 Ton Locomotives, 250 Volt, any gauge
15—8 Ton Locomotives, 250 Volt, any gauge
8—7 Ton Atlas Battery Locomotives
1—6 Ton Battery Locomotive—New
27—6 Ton Locomotives, any gauge
3—6 Ton Jeffrey, MH150 Locomotives
14—6 Ton MH88 Jeffrey Locomotives
10—5 Ton Locomotives, 250 Volt
22—4 Ton Locomotives, 250 V., any gauge
1—4 Ton G.E. Battery Locomotive
2—4 Ton Mancha Battery Locomotives
1—4 Ton 828 G.E. Battery Locomotive Spare Armatures and Trucks for most of above Locomotives

TIPPLE EQUIPMENT

1—4 Cell Jeffrey Baum Jig Washer complete
1—CMI Coal Dryer, 48", Excellent
1—Heat Dryer, Complete
1—Marion Double Roll Primary Crusher
1—24" x 50" Pa. Single Roll Crusher
1—30" x 30" Link Belt Double Roll Crusher
2—24" x 24" Jeffrey Single Roll Crushers
1—18" x 12" Jeffrey Swing Hammer Pulverizer
1—8' x 12' Double Deck Vibrator
1—3' x 8' Low Head Vibrator
5—Jeffrey Traylor Vibrator Feeders
4—Jeffrey Traylor Vibrator Screens
1—Magnetic Separator, Complete
1—Set Jeffrey Dewatering Screens
5—Scraper Conveyors of various sizes
10—Tipple Belts from 15" to 42" width
Air Valves, Blowers, Pumps, New Screens, Parts for CMI Dryers, Speed Reducers, Feeders, practically Jeffrey Baum Jig in parts and many other parts for Tipple

MINE CARS

121—36" t.g. Drop Bottom Cars
267—42" t.g. End Dump Cars, various makes
22—42" t.g. ACF 6 Ton Drop Bottom Cars
22—44" t.g. Drop Bottom Cars, 10 Ton
133—44" t.g. Drop Bottom Cars, various sizes
334—44" t.g. End Dump Cars, various sizes
305—48" t.g. S.D. Drop Bottom Cars, 22" O.H.
2—36½" t.g., 3 Ton, 4 Wheel Push Trucks

RAIL AND WIRE

476—Tons, 30, 40, 50, 65 & 70 lb. Relaying Rail
1,663'—1,000,000 CM Feeder Cable, Insulated
3,065'—750,000 CM Insulated Copper Feeder Wire
3,197'—750,000 CM Bare Copper Feeder Wire
499'—350,000 CM Insulated Copper Feeder Wire
681'—300,000 CM Insulated Copper Feeder Wire
500'—4/0 Stranded Insulated Copper
17,757'—4/0 Trolley Wire
3,324'—3/0 Trolley Wire
1,250'—3/0 Section Trolley Wire
70,444'—4/0 Stranded Highline Wire
17,031'—2/0 Stranded Highline Wire
76,890'—1/0 Solid Copper Trans. Line
42,926'—#2 Stranded Transmission Wire
9,333'—#6 Solid Copper Transmission Wire
3,000'—4/0, 3 Cond. Neoprene Covered Cable
950'—2/0, 3 Cond. Anhydrex & Lead Covered Cable

MISCELLANEOUS

1—Canton Track Cleaner—Excellent
5—HKL Brown Fayro Car Spotters
11—GH Sullivan 5 h.p. Car Spotters
80—Coal Drills, 571CP, 572CP, 573CP, 473CP, A8 and A7 Jeffrey
1—WK29 Sullivan Air Compressor, 120 cu. ft. capacity, 48" t.g.
3—Cantrell Compressors, 120 cu. ft. capacity, 48" t.g.
22—Air Compressors of various sizes
985—Edison Lamps, Model P and R4
57—Auto Starters from 3 h.p. to 100 h.p.
1—HKG Brownie Layer Loader Hoist
90—Hoists from 5 h.p. to 800 h.p.
6—Shop Constructed Jeeps, Truck mounted
579—Stationary Motors—½ to 800 h.p. of various specifications
1—Prefab Building, 40' x 84'
1—Prefab Building, 14'8" x 10'
108—Pumps from ¾" to 4500 GPM of various specifications
1—10 h.p. Deming Deep Well Pump
1—320 GPM, 8" Pomona Deep Well Pump
1—14" Centrifugal Slurry Pump, w/15 h.p. Motor
3,318'—¾" Galvanized Pipe
903'—1-½" Black Pipe
1,000'—2" Plastic Pipe
25,715'—2" Black Pipe
800'—3" Black Pipe
500'—4" Black Pipe
1—Rubber Vulcanizer, type 2
47—Room Blowers, Brown Fayro & Jeffrey
40—Mine Fans from 20" to 6' HI Pressure
15—Battery Chargers, various voltages
5—Cleveland Stoppers
13—Scales for Mine Tracks
9—Rock Dusters up to 30 h.p., track and rubber mounted
1—Dust Collector for Roof Bolting
22—10" x 24" I Beams
Several hundred feet #2 and #3, 2 conductor Machine Cable
SHOP MACHINERY: Lathes, Drills, Grinders, Welders, Shapers, Presses, Milling Machines

We have thousands of dollars worth of parts for the equipment listed.

ALL INQUIRIES WILL BE ANSWERED PROMPTLY—Call, Wire or Write us, day or night

PHONE EITHER OF OUR LOCATIONS FOR FAST RELIABLE SERVICE

ELECTRIC AND MACHINE SUPPLY COMPANY

WHITESBURG, KENTUCKY
BOX #610, Ph. #2223
NIGHT PHONES 2234 or 2347

CLARKSBURG, WEST VA.
BOX #227, Ph. #MA 3-0253
NIGHT PHONES VI 2-2776 or MA 2-6338

BILL CONLEY • MELVIN ADAMS • LEONARD NEASE • JACK FAIRCHILD • HANK UBBING • GORDON STAFFORD

RELAYING • NEW RAILS
TRACK MATERIALS

MIDWEST STEEL CORP.
612 DRYDEN STREET
CHARLESTON 21, W. VA.

9 G.E. DIESEL LOCOMOTIVES
23, 25, 45, 65, 80, & 100 Ton

3-10 H.P. CAR PULLERS
Link Belt 220/440 volt

JEFFERY COAL CRUSHERS
3—24 x 24, 24 x 30, & 30 x 30

R. C. STANHOPE, INC.
60 East 42nd St., N. Y. 17, N. Y.

FOR SALE

11 BU-14E JOY LOADER. EXTRA LONG REAR CONVEYOR. 250 V.D.C. HAS ITS OWN DIESEL POWERED GENERATOR. ACTUALLY USED ONLY ONE YEAR. $6,000.00.

TAMELING SOIL BUILDERS, INC.
3840 S. LARAMIE AVE.
CICERO 50, ILL. BISHOP 2-1818

LOCOMOTIVES

THE IRONTON ENGINE COMPANY
STORAGE BATTERY — TROLLEY
FARMINGDALE, NEW JERSEY
(Formerly Ironton, Ohio, 1902-1950)

MOTORS • GENERATORS
TRANSFORMERS
NEW • REBUILT

ELECTRIC EQUIPMENT CO.

WORLD'S LARGEST INVENTORY
CALL COLLECT GL 3-6783
P. O. BOX 51 • ROCHESTER 1, N. Y.

WE DON'T TALK ABOUT PRICES----WE REDUCE THEM

If you trade before you see us---We both lose money!

WE BUY—SELL—TRADE

JOY EQUIPMENT—REBUILT

1—Joy 14BU Loaders, low pedestal, 7AE.
6—Joy 14BU Loaders, medium pedestal, 7RBE.
4—Joy 14BU 3PE Loaders.
6—12BU10E Joy Loaders complete with Piggybacks.
2—Joy 12BU Loaders, 9E, latest type.
1—Joy 20BU Loader, latest type.
2—Joy 11BU Loaders, latest type.
1—Joy 8BU Loader, 34" overall height.
2—Joy 8BU Loaders, 220 V. AC.
1—Joy curved Bar Head, complete.
6—Reliance 24-J Motors, 7½ H.P.
10—Reliance 38-J Motors, 10 H.P.
20—9-J Motors, 4 H.P.
2—Goodman 660 Loaders on Crawlers 440 V. DC, like new.
1—Goodman 660 Loader on Crawlers, excellent 250 V. DC.
1—Goodman 665 Loader on Crawlers, latest type 250 V. DC.
1—Goodman 865 Loader, 26" hi. Rebuilt. 250 V. DC.
4—Joy 6SC Shuttle Cars, rebuilt.
3—Joy 6SC Shuttle Cars. Latest type.
1—Joy 5SC Shuttle Car. Excellent.
2—Joy 32E9 Shuttle Cars.
2—Joy 32E10 Shuttle Cars, rebuilt.
2—Joy 32E15 Shuttle Cars, rebuilt.
4—Joy 32E16 Shuttle Cars, rebuilt.
2—Joy 42E16 Shuttle Cars, rebuilt.
1—Joy CD-22 Drill, like new.
6—Joy T-2-5 low pan Crawler Trucks.
1—Joy T-2-6 low pan Crawler Truck with reel.
2—Joy T-1 Standard Crawler Trucks, 220 AC.
1—Joy T-1 Standard Crawler Truck, 250 DC.
2—Goodman low pan Crawler Trucks, like new, latest type.
4—Joy 11-B Cutting Machines, like new, 35 & 50 H.P.
1—Joy 7-B Cutting Machine, like new, 250 V. DC.
2—Goodman 212 Cutting Machines, 19" high.
4—Goodman 312 Cutting Machines, 17" high.
3—Goodman 412 Cutting Machines, 19" high.
1—Goodman Machine on Crawler, 31" high. All hydraulic.
6—Goodman 512 Machines with Bugdusters.
6—Goodman 612 cutting machines, 250 and 500 volt.
1—Lee Norse low vein Machine Carrier on rubber.
1—Jeffrey 70 URB rubber tired Cutter, Universal head, perfect condition.
1—Joy 11RU Rubber Tired Cutter with bugdusters, Universal heads, like new. 250 V. DC.
2—Joy 10RU rubber tired Cutters, Universal head, 220/440 V. AC. Perfect.
6—7AU's on track. Universal head.
2—Jeffrey 29UC Cutting Machines, Universal head, cuts anywhere in seam, 38" high, on Crawlers, 250 volt DC.
1—Jeffrey 29LC on Crawlers, rebuilt.

LOCOMOTIVES

1—Goodman 6 ton, 91-A, 27" high, armor plate frame.
2—Jeffrey, 13 ton, type MH-110, 36", 42" and 44" ga.
2—Jeffrey, 10 ton, type MH-110, 42" and 44" ga.
2—Jeffrey, 10 ton, type MH-78, 42" and 44" ga.
2—Goodman 8-30 and 10-30 Locomotives, 26" above rail.
1—Jeffrey MH-124, 6 ton, 24" overall height.
12—Jeffrey, 6 ton, type MH-88, 42", 44" and 48" ga.
4—Jeffrey, 8 ton, type MH-100 2½" armor plate frames.
1—Jeffrey, 6 ton, type 2186, 22" above rail.
3—Jeffrey, 4 ton, type MH-96, 42", 44" and 48" ga.
1—G.E., 4 ton, type 825 Locomotive, 22" high.
10—G.E., 6 ton, types 801, 803, 821 Locomotives, 42", 44" and 48" ga.
1—G.E., 8 ton, type 822 Locomotive, 44" ga.
3—G.E., 10 ton, type 809 Locomotives, 42", 44" and 48" ga.
2—Goodman, type 33, 6 ton, 44" and 48" ga.
3—Westinghouse, type 9C2, 4 ton, 42" and 48" ga.
2—Atlas Battery Locomotives 36" ga.
1—Atlas Trolley Locomotive, 4 ton, 24" high.
2—Westinghouse, type 904, 6 ton, 44" and 48" ga.
2—Westinghouse, type 906, 44" and 48" ga.
2—Westinghouse, type 907, 10 ton, 44" and 48" ga.
8—Jeffrey MH-78 Locomotive Units, cheap.
4—Jeffrey MH-88 Locomotive Units, real bargains.
6—Jeffrey MH-100 Locomotive Units, reasonable.
3—Plymouth Diesel Locomotives, 8 and 10 tons, 42" and 44" ga.
Locomotive Trucks and Spare Armatures for all the above.

TIPPLE EQUIPMENT

5—Complete Tipples, 3 to 5 track, steel and wood.
3—Cleaning Plants, 1 Ea. McNally, Roberts and Schaefer, Jeffrey, Washers and Air-Flo Tables.
4—Complete Aerial Trams for coal or refuse.
3—Complete Rope and Button Lines.
2—Monitor Lines complete with Drums, excellent.
3—Allis-Chalmers 5' x 12' Low-Head Vibrators.
2—Allis-Chalmers 5' x 12' Ripplo Vibrators.
1—Allis-Chalmers 4' x 12' Low-Head Vibrator.
1—Robins Gyrex Vibrator, 4 x 10.
10—Belt and Apron type Loading Booms.
6—Shaker Screens.
1—Robins Car Shakeout.
20—Crushers, various sizes.
4—Mine Scales, 10 & 20 tons
5—Truck Scales, 25 to 40 tons, late type.
Feeders, Belt and Drag Conveyors, Car Retarders, etc.

CUTTING MACHINES

2—Joy 10RU rubber tired Cutters, Universal Head, 220/440 volt AC. Perfect
1—Joy 11RU, rubber tired Cutter, 250 V. DC.
1—Jeffrey 70 URB Cutter, rubber tired, Universal Head, low vein.
2—Jeffrey 29UC Universal Machines on Crawlers.
1—Goodman on Crawlers, 31" overall height.
3—Baby Goodman 212's, rebuilt, 250 V. DC.
2—Goodman 212 Cutting Machines, 19" high.
4—Goodman 312 Cutting Machines, 17" high.
3—Goodman 412 Cutting Machines, 19" high.
6—Goodman 512's, with Bugdusters, like new.
4—Goodman 512's, rebuilt, or as removed from service.
3—Goodman 112's, 220/440 V. AC.
1—Joy 7-B Cutting Machine, 250 V. DC.
4—Joy 11B Cutting Machines, rebuilt, 35 & 50 H.P.
6—7AU's on track, Universal Head.
10—Goodman 12AA's and 112AA's, 250 V. DC.
2—Goodman 324 Slabbers.
2—Goodman 724 Slabbers.
2—Goodman 824 Slabbers.
6—Jeffrey 35L's, like new, 17" high.
2—Jeffrey 35L's, on low vein trucks.
15—Jeffrey 35B's and 35BB's.
2—Jeffrey 29B's on track.
2—Jeffrey 29C's, track mounted.
2—Jeffrey 29L's, on Crawlers. Excellent.
3—Sullivan CE7, 220 V. AC.

CONVEYORS

2—Robins 36" tandem drives, with or without structure.
2—Joy 30" Underground Belt Conveyors, 500' to 2000" each. Excellent.
1—Goodman 97-C 30" Conveyor, 1500' long.
2—Goodman 97-C, 26" Conveyors, 1,000' long.
3—Robins 30" Belt Conveyors, 200' to 2000'.
4—Jeffrey 52-B, 30" Drive and Tail Assembly, complete.
2—Joy MTB 30" Drive and Tail Assembly, complete.
3—Goodman 97 HC 30' Drive and Tail Assemblies, complete.
4,000 Conveyor Belt, 36".
8,000 Conveyor Belt, 30".
4,000 Conveyor Belt, 26".
6—Jeffrey 61AM 12" Chain Conveyors, 300.
2—61EW Elevating Conveyors.
2—61WH 15" Room Conveyors, 300'.
2—Joy 15" Room Conveyors, 300'.
2—Joy 20" Conveyors, 300'.
4—Joy Ladel UN-17 Shakers.
10—Goodman G-12½ and G-15 Shakers.
3,000' Goodman 18" Flat Belt Conveyors, tandem drive, any length. Perfect.
2,500' Goodman 20" Flat Belt Conveyors, tandem drive, any length. Perfect.

CONVERTERS AND DIESEL PLANTS

1—300KW Portable Rectifier, 3 car unit, excellent.
2—500KW G.E. Stationary Rectifiers.
4—1,000KW Stationary Rectifiers.
2—100KW, G.E. TCC-6's, 275 V., Rotary Converters.
1—150KW, G.E. HCC-6, 275 V., Rotary Converter.
1—150KW, 6 phase, Allis-Chalmers Rotary Converter, 275 V. DC.
2—200KW G.E. HCC-6's, Rotary Converters, 275 V. DC. Newly rewound.
3—300KW G.E. HCC-6's, Rotary Converters, 275 V. DC. Like New.
2—300KW Westinghouse, 6 phase, Rotary Converters, 275 V. DC.
2—500KW Westinghouse Rotary Converters, 275 V. DC.
2—200KW Westinghouse Rotary Converters, 275 V. DC. Newly rewound.
(All the above with 6900/13000 and/or 2300/-4000 primary transformers)
2—100KW MG Sets, 275 V. DC.
2—150KW MG Sets, G.E. and Westinghouse, 275 V. DC.
1—200KW MG Set, Westinghouse, rebuilt, 275 V. DC.
1—200KW MG Set, G.E., perfect, 275 V. DC.
2—300KW G.E. MG Sets, like new.
1—300KW Westinghouse, 600 volt MG Set, rebuilt.
2—300KW Westinghouse, 600 volt, 6 phase, Rotary Converters.
2—500KW Westinghouse, 600 volt, DC, 6 phase, Rotary Converters.
2—500KW HCC-6's, Rotary Converters, 6 phase, 600 V. DC.
1—GMC-471 Diesel with 60KW, 250 V. DC Generator.
1—GMC-671 Diesel with 75KW, 250 V. DC Generator.
1—Cummins 125KW Diesel with 250 V. DC Generator.
1—Allis-Chalmers Natural Gas Engine with 100KW Generator, 275 V. DC.
Boilers, like new, 500 H.P.

LOADING MACHINES

6—Joy 12BU with Piggyback Conveyors.
16—Joy Loaders, 14BU, 12BU, 8BU, 11BU, 20BU.
2—Goodman 865 Loaders, 26", on Crawlers.
1—Goodman 665 Loader, on Crawlers.
2—Goodman 660 Loaders, 440 V. AC, perfect.
1—Goodman 660 Loader, on Crawlers.
1—Goodman 460, on track, Rebuilt.
2—Jeffrey 61 CLR's on rubber, 26".
3—Jeffrey L-500 Loaders.
2—Myers Whaley, No. 3 Automatic Loaders.
2—Clarkson Loaders, 26" above rail.

MISCELLANEOUS

1—Complete Five Track Tipple with Washers and Air-Tables.
5—Complete Tipples, 3 to 5 Track. Wood and Steel.
20—Jeffrey Moiveyors on rubber tires.
1—¾ Yard Shovel and Back-Hoe.
1—½ Yard Crawler Crane.
Battery Supply Tractors, Rubber tired.
1—Cantrell Air Compressor on rubber tires.
10—Air Compressors, 1 H.P. to 40 H.P.
2—Joy self-propelled rubber tired compressors, 240 cu. ft.
2—Acme Self Propelled rubber tired compressors, 130 cu. ft.
40—Mine Pumps, all types.
1—Differential 40 Passenger Man-Trip Car.
6—MSA Rock Dusters.
2—Phillips Carriers, 44" and 48" ga.
1—Barber-Greene self-propelled Bucket Elevator.
Pipe, Plastic, Steel, Transit, all sizes 1" to 6".
300—Mine Cars, drop bottom, 42" ga.
30—Mine Cars, drop bottom, 44" ga.
100—Mine Cars, 18" high, end dump, 44" ga.
300—Mine Cars, end dump and drop bottom, 30" high, 48" ga.
1—10 ton Mine Car Scale with Recorder.
15—Brown Fayro HKL and HG Car Spotters.
1—Brown Fayro Hydraulic Car Spotter.
1—12 ton Differential Slate Larry.
Incline Hoists, 25 to 50 H.P.
1—Jeffrey 5' Aerodyne Fan, like new.
1—Jeffrey 6' Aerodyne Fan.
1—Jeffrey 8' Aerodyne Fan.
2—Storage Tanks, 4,000 Gallons.
2—Storage Tank, 10,000 Gallons.
10,000 Five Gallon G.I. Cans, screw lids.
2,500 tons Relaying Rail, 25lb., 30lb., 40lb., 50lb., 60lb., 70lb.
30 Tons Copper—4/0 and 9 Section Trolley 1/0, 2/0, 4/0 Stranded.
Thousands of feet of rubber covered three conductor cable. All sizes.
300—Transformers from 1 to 300 KVA, 110 to 13,-000 primary volts.
400—Electric Motors, ½ to 250 H.P.
Huge Stock of Mine Supplies.
600—MSA Mine Lamps, Chargers, etc.
4—Mine Scales, 10 & 20 ton.
5—Truck Scales, 25 to 40 ton, late type.

THOUSANDS OF OTHER ITEMS.

WE OWN WHAT WE ADVERTISE

PHONE PL 2-4400

J. T. FISH

LOGAN, WEST VA.

EQUIPMENT BARGAINS

1—30" x 36" Link Belt double roll coal crusher.
1—60D3P Joy Shuttle Car.
7—60D1 Joy Shuttle Cars.
8—Chicago-Pneumatic permissible coal drills, model 574, 3/60/440, #700 mounting.
2—10 ton Jeffrey trolley locomotives, 42" ga., 250 volt, type MH-78.
1—13 ton Jeffrey trolley locomotive, 42" ga., 250 volt, type MH-78.
1—13 ton Goodman trolley locomotive, 42" ga., 250 volt.
1—15 ton Jeffrey trolley locomotive, 42" ga., 250 volt, type MH-110.
2—1½ ton Mancha battery locomotives.
2—5 ton G.E. battery locomotives.
2—6 ton G.E. battery locomotives.
2—8 ton G.E. battery locomotives.
1—8 ton Goodman battery locomotive.
3—8 ton Ironton battery locomotives.
4—10 ton Atlas battery locomotives.
1—16' x 22" Ottumwa boxcar loader.
1—13' x 22' Ottumwa boxcar loader.
1—10'6" x 24" Manierre boxcar loader.
1—17'6" x 24" Manierre boxcar loader.
1—8H-42" Jeffrey "Aerodyne" fan.
1—7' Jeffrey "Aerovane-Junior" fan.
1—60 HP Sullivan 3-drum electric slusher hoist.
1—3 HP Joy 2-drum electric slusher hoist.

This is but a partial listing of our tremendous stock of mining, milling and electrical equipment. Send for Catalog 591-C

MORSE BROS.
MACHINERY COMPANY
2900 Brighton Blvd.
Denver, Colorado

COAL TREATING PLANT

1—Complete Viking Oiling System, type #EDPU-10001, 3/60/440 volts, complete with heating unit, and two 25,000 gallon storage tanks.

COPPER

Several Thousand Feet 1,000,000 CM New Weatherproof
Several Thousand Feet 750,000 CM New Bare Stranded
Several Thousand Feet 350,000 CM New Weatherproof
Several Thousand Feet 350,000 CM New Bare Stranded

CONVEYORS

1—Stephens Adamson 36" rubber belt slope conveyor, 725 feet long, complete with approximately 1455 feet of 36" Goodyear special belt like new, 50 HP ball bearing AC motor and speed reducer, and 36" magnetic head pulley. Conveyor used very few months and is actually like brand new.
1—Hewitt Robins 42" belt conveyor, length 390 feet center to center. Complete with head and tail sections, pans, idler troughs, return idlers and approximately 820 feet of 42" rubber belt.
1—Hewitt Robins slope conveyor, length 603' center to center, complete with head and tail sections, pans, idler troughs, return idlers, 250 HP AC motor, 1280 feet of 6 ply 42" rubber belt used one year and like new.

MINING MACHINES

7—10BU Joy Mining Machines, 250 volts DC, complete with permissible plates. Can be bought at a bargain price.
2—512 EJH Goodman Shortwall hydraulic mining machines, 210 volts DC, 7½' cutter bars, each has permissible plate.

MOTOR GENERATOR SETS

4—200 KW Allis Chalmers, new type bought in 1948, and used a very short time. DC end 250-275 volts, 723 amps, compound wound, 1200 RPM, direct connected to 300 HP Allis Chalmers synchronous motor, 3/60/2300 volts, 1200 RPM, complete with Clark fully automatic AC and DC enclosed portable controls. These units are like brand new.
3—150 KW General Electric MG sets, DC end 250 volts, 500 amps, 1200 RPM, direct connected to 225 HP GE synchronous motor 3/60/2300 volts, 56 amps, 1200 RPM, complete with AC and DC switchboard including automatic DC circuit breaker.
2—300 KW Allis Chalmers rotary converters, 2300 volts AC, 250 volts DC, 1200 RPM, each complete with bank of 3 transformers, and switchboard.

LOADERS

7—11BU-11APE Joy, 250 volts DC, ready to go to work at a bargain price.
2—4BU-7BE Joy, 250 volts DC, each has permissible plate, and ready to go to work.

SHUTTLE CARS

2—58C-7BE Joy shuttle cars, hydraulic elevating discharge.
9—42E Joy Shuttle Cars, hydraulic elevating discharge. These will be sold at a bargain price.

GAVENDA BROTHERS, Inc., Canton, Ill.
PHONES: 739 and 2438

1—14 BU Joy AC Loader
2—512 Goodman Machine with Duster AC
1—400L Long Conveyor complete
2—212AA Goodman Cutting Machine
3—35L Jeffrey Cutting Machine
1—600 Ton Steel Bin Like New

ROTARY CONVERTER

3—750 KW 600 volt 1200 RPM Westinghouse Serial Number over 9 Millions Fabricated Based
1—500 KW 600 Volt 1200 RPM Westinghouse
2—500 KW Westinghouse 250/275 volt 1200 RPM
1—300 KW Westinghouse 1200 RPM
2—300 KW G.E. HCC6 Form P 1200 RPM
2—200 KW G.E. HCC6 Form P 1200 RPM
2—150 KW Westinghouse 1200 RPM
1—100 KW G.E. TCC6 Form P 1200 RPM
2—100 KW Westinghouse 1200 RPM

Transformers any voltage for above switching gear, & panel boards.
Mining machines, ITE circuit breaker, hoist, transformers and other items too numerous to mention.

J. M. ALLARA COMPANY
JAEGER, W. VA.
WELLS—68072 Shop. WELLS—82156 or 8270 Night

"FASTER FROM FOSTER" RAIL
& ALL TRACK EQUIPMENT
Nation's Largest Warehouse Stocks
L. B. FOSTER CO.
PITTSBURGH 30 • ATLANTA 8 • NEW YORK 7
CHICAGO 4 • HOUSTON 2 • LOS ANGELES 5

PIPE

500,000 ft 10¾" O.D. 35#
200,000 ft 12¾" O.D. 40#
200,000 ft 8⅝" O.D. 28#
20,000 ft 16" O.D. 42#
All Machine Cleaned, Plain End, No. 1 Grade.

INDIANA-OHIO PIPE CO.
P.O. BOX 5412 Shepard Sta. Phone CL. 3-332
COLUMBUS 19, OHIO

20# — 30# — 40#
NEW RAIL IN STOCK
LEFTON INDUSTRIAL CORP.
Genl. Office: 212 Victor St.
St. Louis 4, Mo.

MINING HOISTS
DOUBLE AND SINGLE DRUM
SHAFT AND INCLINE HOISTS
Please send us your inquiries
LEO A. HARDING
1625 Nay Aug Ave., Scranton 9, Pa.
Phone: Diamond 4-3126 or 2-2913

FOR SALE

1—300 K. W. Ridgway M. G. Set complete with switchboard equipment, 275/300 Volts D.C., 4160/2200 Volts A.C.
1—500 K. W. General Electric Company motor generator set complete less switchboard, 600 Volts D.C., 4160/2300 Volts A.C.

The Valley Camp Coal Company
Box 218, Triadelphia, W. Va., Phone: Linden 7-1500

STEEL RAILS FOR SALE

140 TONS 40 LB
NEW ASCE RAIL

Call or Write
Purchasing Dept.
The Powellton Coal Division
Princess Coals, Inc.
Mallory, W. Va.
Phone LU 3-9332 Man. W.Va.

SEARCHLIGHT EQUIPMENT LOCATING SERVICE

No Charge or Obligation

This service is aimed at helping you, the reader of "SEARCHLIGHT", to locate Surplus New and Used coal mining equipment not currently advertised. (This service is for USER-BUYERS only.)

How to use: Check the dealer ads to see if what you want is not currently advertised. If not, send us the specifications of the equipment wanted on the coupon below, or on your own company letterhead to:

Searchlight Equipment
Locating Service, c/o COAL AGE
P.O. Box 12
N. Y. 36, N. Y.

Your requirements will be brought promptly to the attention of the equipment dealers advertising in this section. You will receive replies directly from them.

Searchlight Equipment Locating Service
c/o COAL AGE
P. O. Box 12, N. Y. 36, N. Y.
Please help us locate the following equipment:

.....
.....
.....

Name ..... Title .....
Company .....
Street .....
City ..... Zone .... State .....

12/59

TO LOWER YOUR MINING COSTS

Check our listing of modern mechanical equipment — whether to completely mechanize or further mechanize your operation — we offer the most complete stock of used and rebuilt machinery.

BUY — SELL — TRADE **IF WE ADVERTISE IT — WE OWN IT**

A.C. MINING EQUIPMENT FOR SALE

1—50 H. P. Goodman Standard, 220 Volt A.C., Cutting Machines
2—11BU-10APH Joy Loading Machines, 220/440 Volts A.C.
1—8BU-11G Joy Loading Machine, 220 Volts A.C. (can be changed to 440 Volts A.C.)
2—4JCM Joy Continuous Miners, 440 Volts A.C.
1—10BU Joy Cutting Machine, 220/440 Volts A.C.
3—512 Goodman Cutting Machines, 220/440 Volts A.C.
6—7B Sullivan Cutting Machines, 220/440 Volts A.C.
1—T-1 Joy Truck, 220/440 Volts A.C.

LOADING MACHINES FOR SALE

1—18 HR Joy Loading Machine, 250 Volts D.C.
4—11 BU-10APE Joy Loading Machines, 250 Volts D.C.
1—11 BU-11APE Joy Loading Machine, 250 Volts D.C.
4—14 BU-7BE Joy Loading Machines, 250 Volts D.C.
2—14 BU-3PE Joy Loading Machines, 250 Volts D.C.
6—12 BU-9E Joy Loading Machines, 250 Volts D.C.
3—8 BU Joy Loading Machines, 250 Volts D.C.
3—7 BU Joy Loading Machines, 250 Volts D.C.
1—665 Goodman Loading Mach. 250 Volts D.C.
2—Long 12" Piggyback Conveyors, each 300' long, complete with PT-12 Piggybacks and 12BU Joy Loading Machines.
1—11BU-14E Joy Loading Machine, 250 Volt DC, 75 H.P. Main Motor, Serial No. 5803.

SHUTTLE CARS FOR SALE

2—10SC-1E Joy Shuttle Cars, 250 Volt DC, completely modern.
2—570-48 Goodman Shuttle Cars, 250 Volts, D.C.
4—5SC Joy Shuttle Cars, Matched Pair, Elevating Discharge, Disc Brakes, 250 Volts D.C.—Modern.
2—6SC-7E Joy Shuttle Cars, Matched Pair.
4—6SC-5E Joy Shuttle Cars, Elevating Discharge, 4-Wheel Steering, 250 Volts D.C.
3—42E1B Joy Shuttle Cars, Disc Brakes, Elevating Discharge, Completely Modern, 250 Volts, D.C. 2-Standard, 1-Opposite Standard Drive.
1—Jeffrey Shuttle Car, 4-Wheel Drive and Steer.
2—32E16 Joy Shuttle Cars, Disc Brakes & Elevating Discharge.
1—42E15A Joy Shuttle Car.
1—32 E-7 Joy Shuttle Car.

CUTTING MACHINES FOR SALE

1—512 CJ Goodman Cutting Machine, 50 H.P. with bugduster.
1—11BU Joy Cutting Machine, 250 Volts D.C. with 9' Cincinnati Bar, Chain and bugduster.
1—10BU Joy Cutting Machine, 250 Volt D.C. with bugduster.
2—29UC Jeffrey Universal Cutters, Permissible, 250 Volts D.C.
1—512 CCH Goodman Cutting Machine, 250 Volts D.C.
5—35B Jeffrey Cutting Machines, 250 Volts D.C.
6—35BB Jeffrey Cutting Machines, 250 Volts D.C.
2—29LC Jeffrey Cutting Machines, 250 Volt D.C.
2—512 EJH Goodman Cutting Machines
2—512DA Goodman Cutting Machines, 250 Volts D.C.
2—7AU Sullivan Cutting Machines, 250 Volts D.C.
3—212 AB Goodman Machines.
2—412 AA Goodman Machines.
1—35L Jeffrey Machine 35 H.P.

CONTINUOUS MINERS FOR SALE

3—4JCM Joy Continuous Miners, 440 Volts A.C.

RECTIFIERS FOR SALE

1—150 KW General Electric Stationary Rectifier, 440 Volts Primary, 275 Volts D.C., Serial No. 6628.
1—300 KW Westinghouse Three-Car Portable Rectifier, 7200/13000 Volts, 3 phase, 60 cycle primary and 275 Volts D.C. secondary.

ROTARY CONVERTERS FOR SALE

1—150 KW Rotary Converter, Serial No. 1054562, with 150 KVA transformer and panel boards.
1—300KW Westinghouse, Pedestal Type Converter, 275 Volts D.C., Primary 2300/4000.

COAL DRILLS FOR SALE

25—CP-472 Electric Coal Drills, 250 Volts D.C.
5—CP-572 Coal Drills.

CRUSHER FOR SALE

1—36" x 36" Double Roll McLanahan Stone Crusher, complete with 100 H.P. Motor.

COMPRESSORS FOR SALE

3—Acme Self-propelled Air Compressors, 83R, Model 168, Capacity 176CFM, with 40 H.P. Reliance Compound Motor. Excellent Condition.

LOCOMOTIVES FOR SALE

1—10 Ton Goodman Locomotive, Serial No. 4371—Type 32AO4-1, 250 Volt D.C., 42" track gauge. Height 34".
1—MH-150 Jeffrey Locomotive, 42" track gauge. 250 Volt D.C., 26½" high, rebuilt.

ROCK DUSTERS FOR SALE

1—MSA Track Mounted Rock Duster, 10 H.P., A.C. or D.C., high pressure, 30" high, any gauge.
2—MSA Bantam Rock Dusters, Rubber Tired, Portable.
2—MSA Bantam Rock Dusters, Skid Mounted.
1—American Mine Door, Wheel mounted bantam type rock duster, 250 Volts D.C., 22" high.

HOISTS FOR SALE

10—#11½ Vulcan-Denver Material Hoists, Complete with 3 H.P. D.C. Compound Wound 1750 RPM General Electric Motor.
2—Brownie Hoists, Model HKL—Good condition.
1—Brownie Hoist, Model HKM—Good condition.

ELEVATORS FOR SALE

1—PL11-14 Joy Elevator.
2—Joy PL11-16 Elevating Conveyors.

MACHINE TRUCKS FOR SALE

1—Goodman Low Vein Truck.
4—T2-5APE Joy Trucks, 250 Volts D.C. Permissible.
2—T2-5APE Joy Machine Trucks, 250 Volt D.C., equipped with hydraulic system for drill.

CHAIN CONVEYORS FOR SALE

5—61AM Jeffrey Chain Conveyors, 10 H.P. 300' long.
3—61HG Jeffrey Chain Conveyors, 5 H.P. 40' long.

DIESEL PLANTS FOR SALE

1—60 KW, G.M. Diesel Generator Set, with 60 KW, 250 Volt D.C. Delco Generator.
1—100 KW Waukesha Diesel Generator with 220/440 Volts D.C.
1—100 KW Diesel Generator Unit, with G.M. Diesel Engine and 100 KW Generator.
1—D13000 Caterpillar Diesel Generator Unit—with Caterpillar engine and 75 KVA G.E. generator self-regulating, 220 Volt A.C.
1—250 KW Diesel Generating Plant, consisting of Westinghouse 250 KW 275 Volt Compound Wound Generator driven by Twin 6110 General Motors Engines, Complete with switchgear and all appurtenances. New in 1956.

MOTOR GENERATORS FOR SALE

1—50 KW Westinghouse MG Set, 440 Volt AC, 250 Volt DC.
1—300KW Westinghouse Motor Generator Set, synchronous motor, 433 KW Output, 435 KVA, 2200 Volts, 1200 RPM. D.C. generator 300 KW, 275 Volts, 1200 RPM. Compound Wound. Complete with D.C. panel and switch gear.
3—50 KW G.E. and Westinghouse Motor Generator Sets, 2300 Volts A.C., 275 Volts D.C. Complete with switching gear.
1—200 KW Ridgeway Motor Generator Set, Complete with switchgear and 1600 amp. I-T-E automatic circuit breaker, 2300 A.C., 275 Volts D.C.

BELT CONVEYORS FOR SALE

1—Goodman 99-5-GT-36 Tandem, 36" wide Belt, head and tail complete with 40 H.P. drive.
2 only 1200' 26" Belt Conveyors with 30 H.P. 250 Volt D.C. Drives.

MISCELLANEOUS FOR SALE

3—15 H.P. Heads and Tails
400 ft.—15" Pans and Chains
3—35B Jeffrey Armatures, 250 Volts DC.
4—902, 250 Volts D.C. Westinghouse Motor Units, only.
1—R3E Jeffrey Reel and Motor, complete.
1—PL 11-14 Joy Elevator.
10—Goodman 512 Cutter Bars and Chains.
210—AC&F 42" Gauge, 48" high Drop Bottom Mine Cars. Condition like new.
1—24" Fan with drive.
2—7½ H.P. Tricycle Type Rubber Tired Mine Tractors, 7½ H.P. 220 Volt Single Phase Motors or 250 Volt D.C. Motors.
3—24 J Motors, 7½ H.P., 250 Volt D.C.

ALL EQUIPMENT LISTED AND HUNDREDS OF OTHER ITEMS ARE IN STOCK AND MAY BE INSPECTED AT OUR SHOP AND EQUIPMENT YARD LOCATED AT RALEIGH, WEST VIRGINIA

MOUNTAIN STATE EQUIPMENT COMPANY

Box 1050, Beckley, West Virginia **Phone CLifford 3-7383**

J. J. MAHONEY
Res. Phone CLifford 3-6804, Beckley

WILLIAM R. MONK
Res. Phone CLifford 3-6907, Beckley

R. E. KAMM
Res. Phone 4281, Summersville

—ADVERTISERS IN THIS ISSUE—

***Indicates more product information may be found in company advertising appearing in COAL AGE 1959 July Mining Guidebook and Buying Directory Issue. Check your Guidebook Index.**

*Ac..e-Hamilton Manufacturing Co. 57
*Allegheny Ludlum Steel Corp. 21
*Allis Chalmers 29
*ACF Industries Inc., American Car & Foundry Div. ..... Third Cover
*American Cyanamid Co. 41
*American Pulverizer Co. 168
Ashland Oil Co. 161
*Atlas Powder Co. 157
*Autocar Div., White Motor Co. 52

*Barber-Greene Co. 153
*Bethlehem Steel Co. 15, 165
*Bird Machine Co. 4
*Bixby-Zimmer Engineering Co. 167
*Broderick & Bascom Rope Co. 47
*Bucyrus-Erie Co. 34

*Caterpillar Tractor Co. 64–65
*Chicago Pneumatic Tool Co. 121
*Cincinnati Mine Machinery Co. 45
*Collyer Insulated Wire Co. 58
Curtiss-Wright Corp. (So. Bend Div.) 61

Denver Equipment Co. 63
Detroit Diesel Engine Div., General Motors. 71
Dodge Manufacturing Co. 2
*Dorr-Oliver Inc. 90–91
*Dravo Corp. 14
Durakool Inc. 134

Eaton Manufacturing Co. 10
Ensign-Bickford 72

Fairview Bit Co. 170
*Falk Corp. 50
Farval Corp. 53
*Federal Mogul Service Div., Federal-Mogul-Bower Bearings Inc. 44
Fletcher & Co., J. H. 56
Ford Motor Co. 88–89

*Galis Electric & Machine Co. 6
General Electric Co. (Construction Materials Div.) 39
*Goodman Manufacturing Co. 33
*Goodrich Industrial Products Co., B. F. 1
*Goodrich Tire Co., Div. B. F. Goodrich Co. 163
*Guyan Machinery Co. 166, 170

*Hendrick Manufacturing Co. 60
Hendrix Manufacturing Co. 104
*Heyl & Patterson Inc. 27

*International Harvester Co. 42–43

*Jeffrey Manufacturing Co. 87, 149
*Joy Manufacturing Co. 100–101, 174

Kelly Manufacturing Co. 70
*Kennametal Inc. 51
Koehring Co. 12–13

Lecco Machinery & Engineering Co., sub Fairmont Machinery Co. 155
*Lee-Norse Co. 66–67
*LeRoi Div., Westinghouse Air Brake Co. 133, 135
*LeTourneau-Westinghouse Co. 141, 143
*Lima Works, Construction Equipment Div., Baldwin-Lima-Hamilton Corp. 99
*Link-Belt Co. ..... Fourth Cover
*Ludlow-Saylor Wire Cloth Co. 175
*Lukens Steel Co. 62

*McLanahan & Stone Corp. 173
*McNally Pittsburg Manufacturing Co. 35, 36–37, 38, 164
*Mine Safety Appliances Co. ..... Second Cover
Mine & Smelter Supply Co. 159
Morton Salt Co. 24

National Tube Div., United States Steel Co. 20
*New York Rubber Co. 142
Nolan Co. 46
North American Gear Co. 166

Pattin Manufacturing Co. 70
Phelps Dodge Co. 49
Porter Co., Inc., H. K. Thermoid Div. 171
*Post-Glover Electric Co. 172

*Republic Steel Corp. 22–23
*Roebling Sons Corp. 32
*Rome Cable Co. 25

*Sanford-Day Iron Works 16
*Scandinavia Belting Co. 3
Searchlight Section 183–187
*Simplex Wire & Cable Co. 8
*Spencer Chemical Co. 19
*Stamler Corp., W. R. 48

*Texaco Inc. 59
*Thompson Products Inc. (Valve Div.) 40
Tool Steel Gear & Pinion Co. 55

*United States Rubber Co. (Mechanical Goods Div.) 68–69
*United States Steel Corp. 126–127

*Victaulic Co. of America 169

*Western Machinery Co. 54
*Westinghouse Electric Co. 17, 18
*Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp. 98
Wild Heerbrugg Instrument Co. 31

CLASSIFIED ADVERTISING
F. J. Eberle, Business Mgr.

PROFESSIONAL SERVICES 182

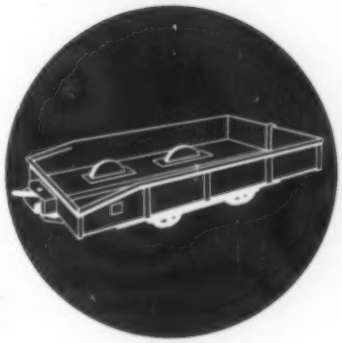
EMPLOYMENT OPPORTUNITIES 183

EQUIPMENT
(Used or Surplus New)
For Sale 183–187

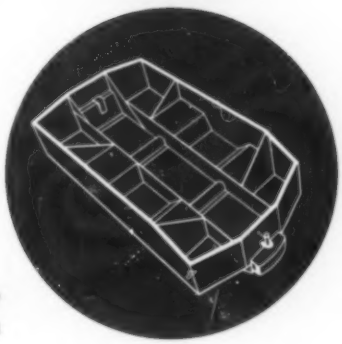
ADVERTISING SALES STAFF

Atlanta 3 ..... M. H. Miller, 1301 Rhodes-Haverty Bldg., Jackson 3-6951
Chicago 11 — G. A. Mack, F. W. Roets, 520 N. Michigan Ave., Mohawk 4-5800
Cleveland 13 .... W. W. Forystak, 55 Public Square, Superior 1-7000
Dallas 1 ..... P. R. Holland, 1712 Commerce St., Riverside 7-5117
Denver 2 ..... J. W. Patten, Mile High Center, 1740 Broadway, ALpine 5-2981
Los Angeles 17 .. J. H. Uphoff, 1125 W. 6th St., Madison 6-9351
New York 36 .. H. C. Chellson, R. Peckham, 500 5th Ave., Oxford 5-5959
Pittsburgh 22 .... Wm. H. H. Ginder, 1111 Oliver Bldg., EXpress 1-1314
Philadelphia 3 .. J. B. Lewis, 6Penn Center Plaza, Philadelphia 3, Locust 8-4330
St. Louis 8 ..... F. W. Roets, Continental Bldg., 3615 Olive St., Jefferson 5-4867
San Francisco 4 .. J. W. Otterson, 68 Post St. Douglas 2-4600
Europe ..... E. E. Schirmer, McGraw-Hill House, 95 Farringdon St., London E.C. 4, England
Michael R. Zeynel, 85 Westendstrasse, Frankfurt/Main, Germany. Telephone 772045 772059

DROP BOTTOM
4 wheel or 8 wheel



END DUMP
4 wheel



ROTARY DUMP
4 wheel or 8 wheel

acf MAKES ALL THREE

No matter what type of car your mining operations call for **acf** has a car to fit your needs. **acf** mine cars are built in all types and sizes from 2 to 30 tons, or more.

For safety, low maintenance and high speed constant haulage all **acf** mine cars have special features developed through many years of experience in design and manufacture.

Anti-friction bearings in the load-support wheels permit safe high speed from loading point to unloading point and back again for more. Automatic couplers make car handling safer and easier. **acf** double-action spring bumpers lower maintenance on everything from trackage to locomotive...provide smoother, safer hauling.

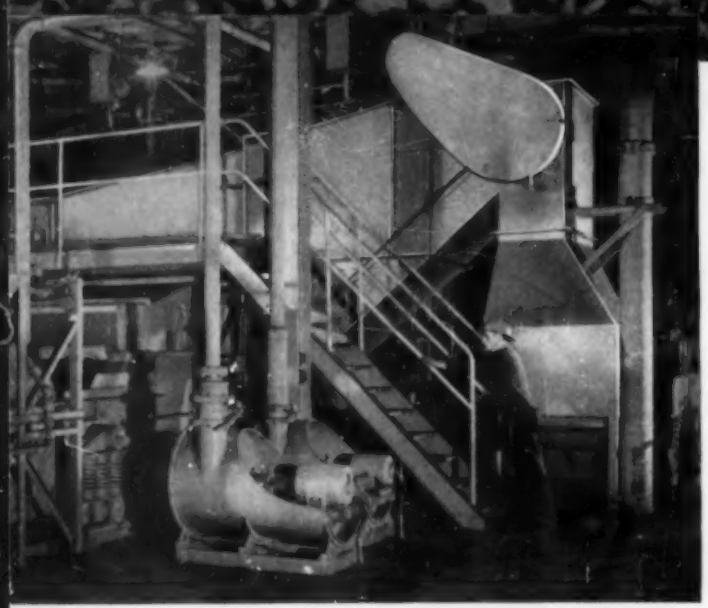
For complete information about the full line of **acf** Constant Haulage Mine Cars in all sizes and types contact the nearest **acf** sales office or discuss your haulage problems with one of our sales representatives.

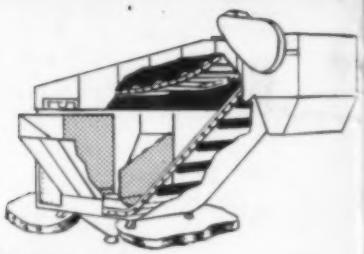
AMERICAN CAR AND FOUNDRY
Division of acf Industries, Inc.
750 Third Avenue, N. Y. 17, N. Y.

SALES OFFICES:
NEW YORK
PHILADELPHIA
BERWICK, PA.
WASHINGTON, D. C.
CLEVELAND
HUNTINGTON, WEST VA.
CHICAGO
ST. LOUIS
SAN FRANCISCO

Link-Belt coal washers deliver your product

uniformly clean





AT CLINCHFIELD

LINK-BELT TANK-TYPE FLOAT-SINK CONCENTRATOR satisfies cleaning requirements of Clinchfield Coal Company's new preparation plant (Clinchfield, Russell County, Va.). This coal washer utilizes the heavy-media separation process in a magnetite and water mixture. Efficient for extremely high or low specific gravity separation . . . when a large percentage of coal is near the separation gravity . . . when amount of impurities in feed fluctuates or product must be quickly changed. Cleans larger sizes, minimizing manual picking.

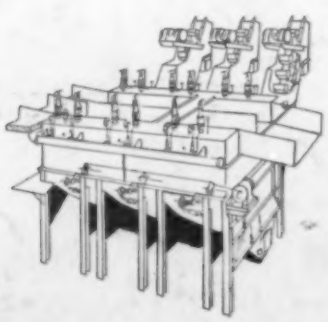
PICTURED are just two of many progressive mine operations in which Link-Belt has furnished the answer to particular coal cleaning problems. Whether your operation is best suited to the Link-Belt heavy-media system or the Link-Belt air-pulsated wash box system—impurities are removed at low cost . . . ash percentages are lowered.

Call your Link-Belt office today and ask for Book 2655. Our specialists will work with your engineers in determining the right equipment for a cleaner, more marketable coal at lower cost.

LINK-BELT

COAL PREPARATION AND HANDLING EQUIPMENT

LINK-BELT COMPANY: Chicago 9, Birmingham 9, Cleveland 20, Denver 2, Detroit 4, Huntington 9, W. Va., Indianapolis 6, Kansas City 8, Mo., Louisville 2, Pittsburgh 13, Seattle 4, St. Louis 1, Salt Lake City 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 15.050



AT JOANNE

LINK-BELT AIR PULSATED WASH BOX was the choice of Joanne Coal Company for its metallurgical coal plant located at Rachel, West Va. Extremely flexible for high-capacity cleaning of sized or unsized coal, Link-Belt air-pulsated washers are available in single and dual bed models to satisfy all capacity requirements. The dual bed model (pictured) has higher capacity due to increased washing bed width and individual bed controls . . . provides sharper separation over the entire washing area. Both models can incorporate the new Aeropoise refuse control for completely automatic refuse discharge.